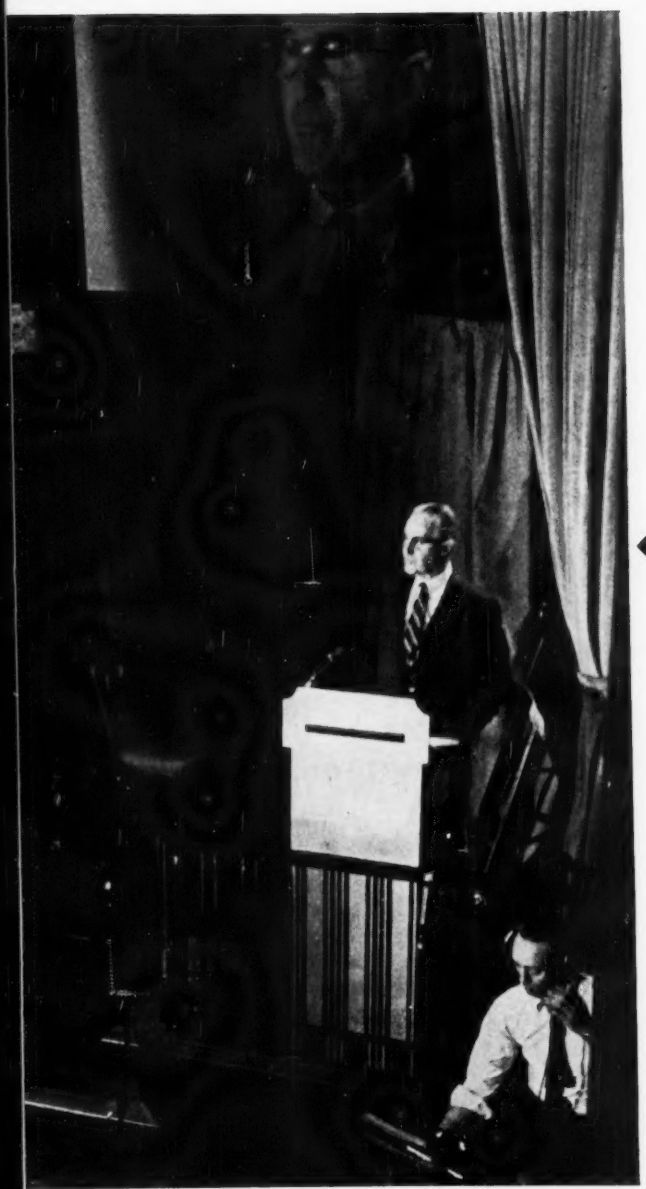
A McGRAW-HILL PUBLICATION

Chemical Week



CPI capital spending drops in '59—but look for a pickup in '60 and '61 . . . . . p. 39

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Sound shakes the filter, bags last longer, in Dracco's new cleaning system . . . . p. 101

White elephant or dark horse? New Morgantown plant study points path to payoff . p. 119

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November 14, 1959

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others, made to order

Send *for new booklet which describes our operation*

THE TRUBEK LABORATORIES

East Rutherford, New Jersey

North American's new MARK-20

20,000 gallons in one load!

Here is the car railroads have been waiting for to compete better with other forms of transportation. The MARK-20 offers shippers economies in leasing rates, demurrage costs, and handling charges. The MARK-20 offers the railroads lower operating costs and in turn advantage can be taken of incentive rates with higher minimums.

Compare the following load limits!

The MARK-20—approx. 180,000 lbs.

8,000 gallon tank car—approx. 90,000 lbs.

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North American Car will custom build the MARK-20 to shipper's specifications. The car can be insulated, coiled, or compartmentalized. It is domeless for greater strength and can withstand pressure of 100 lbs. per square inch compared with 60 lbs. of most other tank cars.

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- Electrically welded—no rivets
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Remember, if it's NEW . . . it's NORTH AMERICAN

Shippers! Here is the way to reduce your distribution costs and restore traffic to the rails

Closed system protects quality of SOLVAY *Anhydrous* ALUMINUM CHLORIDE

Contamination by air can destroy the purity and reactivity we take such care to produce in Solvay® Anhydrous Aluminum Chloride. So, from production to packaging we protect it from atmospheric moisture. An example of this is the airtight chute (circled) used in loading the Solvay-designed truck for bulk shipments. Similar precautions are taken in filling the various sizes of steel drum packages to assure product quality and safe handling.

This care continues right into the customer's plant . . . through Solvay Technical Service that helps plan handling procedures and bulk storage systems. For further information, including the range of screen sizes, mail the coupon.

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Please send material on anhydrous aluminum chloride as follows:

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Chemical Week

TOP OF THE WEEK **NOVEMBER 14, 1959**

TV quiz show hearings involve cosmetic maker, drug producer, may lead to more stringent TV advertising rules ....**p. 40**

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44,577 copies of this issue printed

Vol. 85
No. 20

Chemical Week is published weekly and copyright © 1959 by McGraw-Hill Publishing Co., Inc., 330 W. 42nd St., New York 36, N. Y. Place of publication: 3rd and Hunting Park Ave., Philadelphia 40, Pa. Second-class postage paid at Philadelphia. Subscription: $3/year in U.S.A. Send subscription correspondence and change of address to Fulfillment Manager, Chemical Week. Please see page 28 for subscription requirements.

Postmaster: Please send Form 3579 to Chemical Week, 330 West 42nd St., New York 36, N. Y.

this is today's Norfolk

The first merger of two major, independently operated railroads in modern times is a reality. The historic merger of the Virginian Railway into the Norfolk and Western Railway has been approved by the Interstate Commerce Commission.

The bigger, stronger and more efficient Norfolk and Western has two principal objectives. First, the railroad will provide faster and continuously improved service to industry and business along its lines and throughout the nation. Second, it will make available to industry a number of choice new plant sites. The territory of these sites will offer industry an abundance of low-cost power, ample industrial water, huge supplies of superior, all-purpose Bituminous coal, high quality limestone and a great variety of other raw materials; nearness to the big consuming markets of the Southeast, Middle West and North, and overseas markets through the modern ice-free Port of Norfolk on famed Hampton Roads, plus stable, home-rooted manpower, reasonable taxes and communities that are friendly to industry. With an enlarged and strengthened industrial development department, the railroad will go all out to attract new industries to the expanded territory of the six progressive states it serves.

The merger of the two railroads makes the Norfolk and Western one of the financially strongest and most efficiently operated trunk lines in the United States, with excellent connections to the four points of the compass. This strategically located rail system has 2,747 miles of road, 5,870

Norfolk

Two Great Railroads to Become One

and Western . . . On the Go!

miles of track . . . nearly a billion dollars in assets . . . 81,000 freight cars — more freight cars per mile of line than any other railroad in the United States 250 miles or more in length . . . the nation's newest and most modern fleet of diesel locomotives . . . up-to-date signalling and communications systems . . . huge Tidewater terminals and many other top-notch facilities.

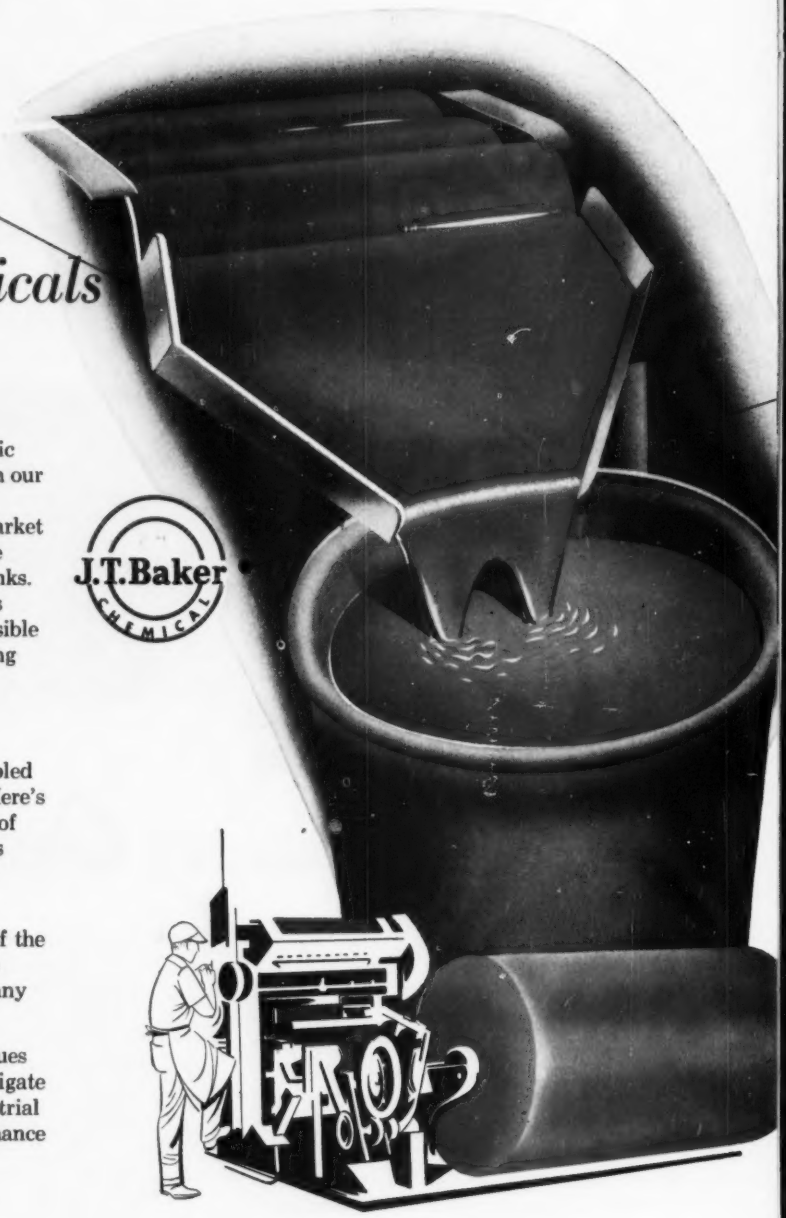
Physical consummation of the two railroads with extensive improvements will get underway as soon as possible. The Norfolk and Western looks forward eagerly to taking full advantage of the bright opportunities in the dynamic years ahead.

Statement by Stuart T. Saunders, N&W President:

"The Interstate Commerce Commission's approval of the merger is a landmark decision which signals a new day in the progress and development of greater efficiency and better service by the combined railroads. It reflects a farsighted viewpoint on the part of the Commission and a sympathetic interest in solving one of the major problems which confront the railroad industry today — the elimination of duplicating and unneeded transportation facilities and services. The Norfolk and Western expresses sincere appreciation to those progressive industries and individuals, civic groups and other organizations whose wholehearted endorsement helped to make this historic merger possible. It is an invigorating challenge, and opens a new era for the new system. The bigger, stronger and more efficient Norfolk and Western is on the go. The railroad has the facilities, the know-how, the determination and vigor to meet the challenge — to do the job."

and Western Railway

"It is gratifying to have Baker dependable chemicals on the job."



You need only glance around you for dramatic evidence of the growing importance of color in our everyday lives. Our magazines are full of eye-appealing, colorful merchandise. Supermarket shelves are full of bright, gay packages whose colorful sales appeal is provided by printing inks. The pleasant hues of our household products and the brilliance of our textiles are made possible through the imaginative use of color. Supplying the pigments for these inks, dyes and colors is the creative job of Interchemical's Color & Chemicals Division.

But creativity is not enough. It must be coupled with dependability of the colors themselves. Here's where Interchemical's choice of suppliers and of raw materials is helpful for as Interchemical's letter states, "We have been delighted with the results obtained with Baker Chemicals."

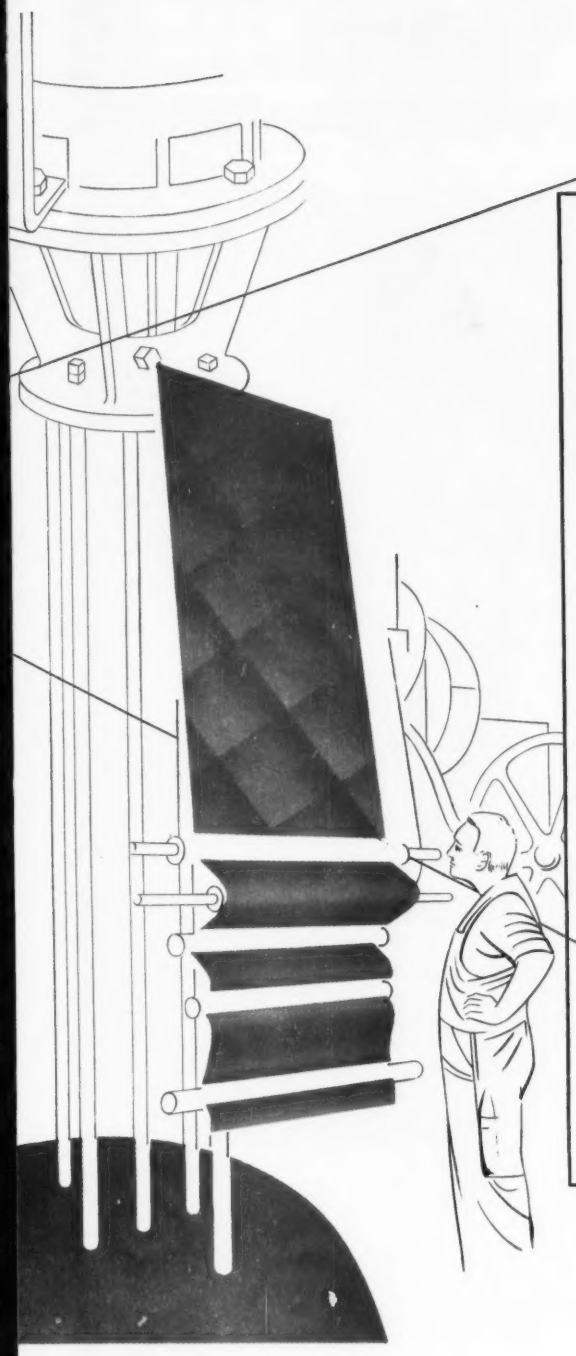
Helping to protect the precious trademarks of the country's leading companies is a privilege the J. T. Baker Chemical Co. has earned over many years of dependable service.

Whatever your particular processing techniques and problems are, may we suggest you investigate the advantages and economies of Baker industrial chemicals? You'll enjoy unsurpassed performance at no premium price.

J. T. Baker Chemical Co.
Phillipsburg, New Jersey

PURITY BY THE TON — FO

one of the guardians of this precious trademark



Interchemical
CORPORATION
Color & Chemicals Division

HAWTHORNE, N. J.
HA. 7-6700

October 12, 1959

Mr. Warren F. Schumacher
General Sales Manager
J. T. Baker Chemical Co.
Phillipsburg, New Jersey

Dear Mr. Schumacher:

As a manufacturer of specialty organic pigments and pigment dispersions, used in printing inks, industrial coatings and textile coloring materials, stringent quality controls are mandatory.

From basic starting materials to finished products, these controls are continuously operative for both quality and uniformity.

On all counts we have been delighted with the results obtained with Baker Chemicals. The quality and uniformity have proved unvarying lot after lot. I suppose we have come to take for granted the excellent service and assured delivery that we have enjoyed over the past 8 years, so I would like to take this opportunity to express our appreciation.

It is very gratifying to have Baker dependable chemicals on the job.

Sincerely yours,

Louis E. Bataille

Louis E. Bataille
Purchasing Agent
Color & Chemicals Division

PRODUCTION USE

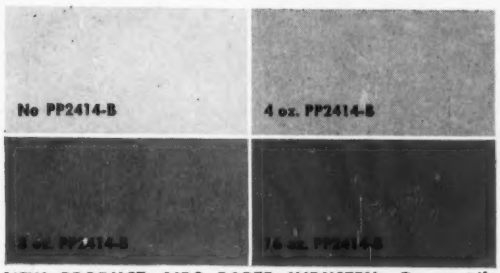
CYANAMID

Chemical Newsfront

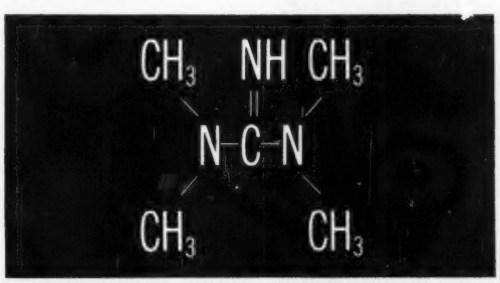
BOON TO BATHING BEAUTIES. Cyanamid's ANTIOXIDANT 425® works ceaselessly to protect clean, white, strong rubber thread—essential component of bathing suits and other "stretch" garments—against the loss of elasticity- and strength-sapping ravages of oxygen. Unrivaled in its non-staining characteristics, Antioxidant 425 also assures the ultimate in long-lasting whiteness.

(Rubber Chemicals Department)

PILLSBURY PACKAGES PACK NEW PUNCH. In the hot war for supermarket shelf space, these two Pillsbury packages have scored an impressive victory by adding Cyanamid's CALCOFLUOR® White brightener to the paper and board stock. The whiter white base that Calcofluor provides makes package colors sing and printing pop. With a zestful look of added quality and cleanliness, Calcofluor treated packages demand shelf exposure . . . invite faster impulse buying. **(Dyes Department)**



NEW PRODUCT AIDS PAPER INDUSTRY. Cyanamid's Paper Product 2414-B, a water soluble polyacrylamide resin, is now being used in the paper industry to improve the retention of fines and pigments. In addition to reducing costly waste of pigments, other benefits are: more even coloring on both sides of the sheet, faster machine drainage, and less stream pollution from pigments. Its effectiveness as a pigment retention aid is demonstrated in the photo above. The four handsheets contain equal amounts of colored pigment while the PP2414-B content varies from zero to 16 ozs. per ton of paper as indicated. Conversely, color specifications may be maintained by the addition of PP2414-B in appropriate amounts while reducing the pigment content. **(Paper Chemicals Department)**



TONGUE-TWISTER STARTS GROWING UP. This is a significant year for Cyanamid's *Tetramethylguanidine* (TMG). Last year, the formula for TMG appeared here as a new chemical available for research only. Now it may be ordered in drum quantities. TMG is a liquid with a slight ammoniacal odor. It boils at 159-160° C and is soluble both in water and organic solvents. Chemists in need of a strong, all-organic base should find these properties worth evaluating. **(Market Development Department)**

CYANAMID

AMERICAN CYANAMID COMPANY

30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

NEWS AT A GLANCE...

Cyanamid's new liquid paper dye, Green MX Liquid, eliminates dusting and handling problems resulting from the use of some powdered dyes...Better uranium mining yields now possible with Cyanamid's new Superfloc 16 flocculant. By binding together tiny ore particles, Superfloc 16* forms larger ones that settle out of suspension more easily...Improved process for manufacturing Melamine will be utilized at Cyanamid's new Wallingford, Conn., plant. Now under construction, plant is expected to be in operation by early 1960...Fish processors and consumers will benefit from application of Cyanamid's Acronize® chlortetracycline to fish. Recently accepted by the government for use on vertebrate fish, unpeeled shrimp and shucked scallops, Acronize appreciably extends their fresh-caught flavor... Formica Corporation builds new research and product development laboratory at Evendale, Ohio. The new facility, scheduled for completion by spring 1960, will increase Formica's research-development activity 40%. Formica Corporation is a Cyanamid subsidiary.

* Trademark

For further information on products in this advertisement wire, phone—or mail this coupon to:

AMERICAN CYANAMID COMPANY
30 Rockefeller Plaza, New York 20, N. Y.
Please send me additional information

- ☐ ANTIOXIDANT 425
- ☐ CALCOFLUOR
- ☐ PAPER PRODUCT 2414-B
- ☐ TMG
- ☐ SUPERFLOC 16
- ☐ MELAMINE
- ☐ ACRONIZE
- ☐ GREEN MX LIQUID
- ☐ FORMICA® Laminated Plastic

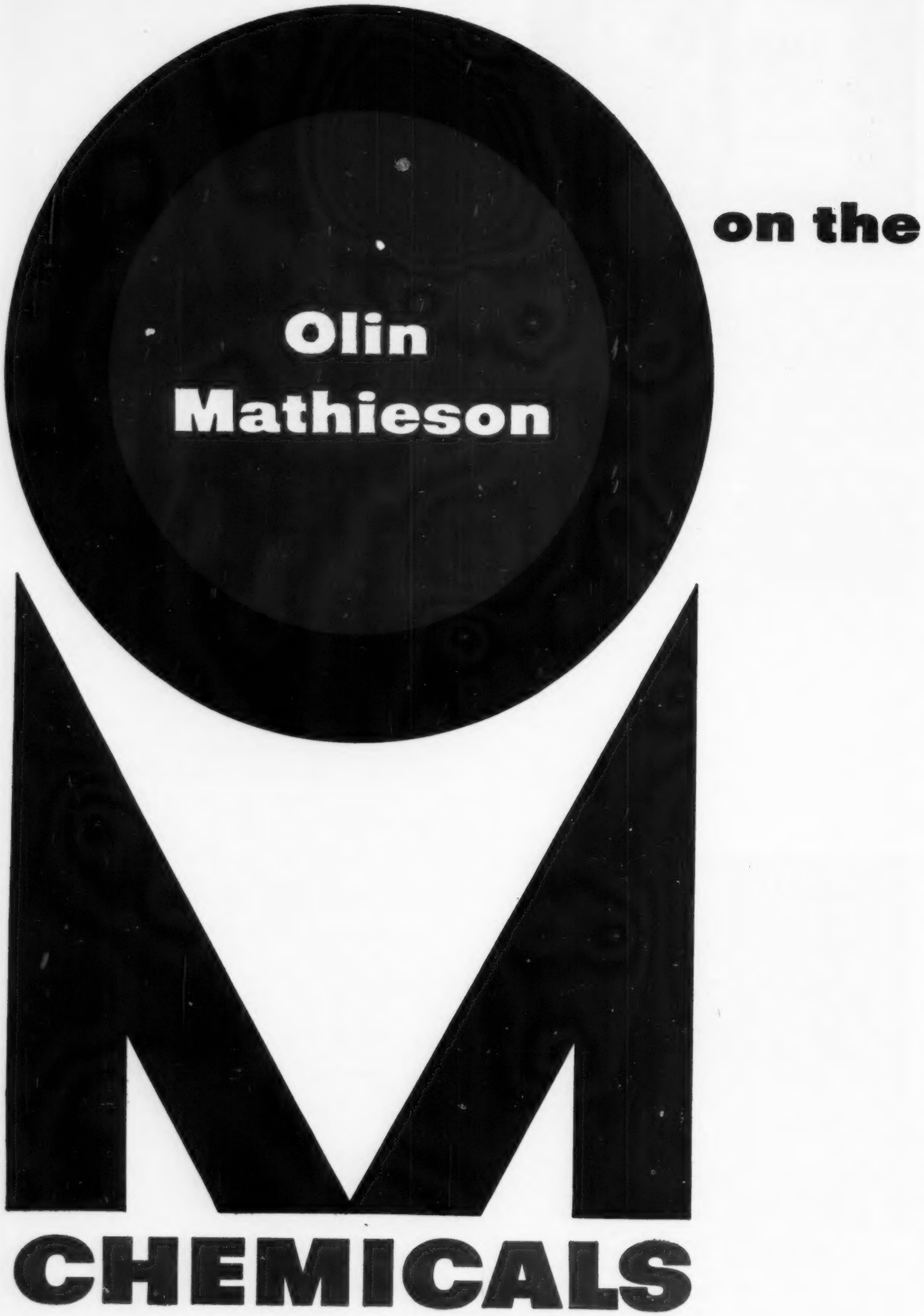
Name_____

Company_____

Position or Title_____

Address_____

City_____ Zone____ State_____


on the
Olin
Mathieson
CHEMICALS

move... in

organic chemicals

Currently, Olin Mathieson's Chemicals Division is expediting a new 30 million dollar program to provide increased production of important chemicals. An important portion is the expansion at its Doe Run Plant near Brandenburg, Ky., involving these organic chemicals:

- **Propylene oxide, propylene glycol and polypropylene glycols... new production facilities will be on stream in a few months.**
- **Glycerin, epichlorohydrin... new facilities are now under construction to utilize the recently developed Olin Mathieson process.**
- **Ethylene oxide... a new direct oxidation plant will be on stream next year.**
- **Poly-Solv glycol ethers, Poly-Tergent surfactants and ethylene dichloride... major increases in capacity will be completed during the next few months.**

If your plans involve any of these products, let's get together. Complete technical service is available. Olin Mathieson Chemical Corporation, Chemicals Division, 745 Fifth Avenue, New York 22, New York.

MATHIESON

Ethylene Oxide • Ethylene Glycol • Diethylene Glycol • Triethylene Glycol • Polyethylene Glycols (Poly-G) • Monoethanolamine • Diethanolamine Triethanolamine • Glycol Ethers (Poly-Solv) • Surfactants (Poly-Tergent) • Ethylene Dichloride • Dichloroethylether • Polyamide Resins (Omamid)

POLY-SOLV®, POLY-G®, POLY-TERGENT®, AND OMAMID ARE OLIN MATHIESON TRADEMARKS 7321

WONDERWALL, West Virginia's new multiwall bag made with Kraftsman Clupak paper, is inspected by industry leader Robert S. Gerstell, President, Alpha Portland Cement Company, Easton, Pa. "This isn't the first time we've introduced revolutionary advances for the sake of better operations in our plants . . . and for our ultimate customers," Mr. Gerstell states.

...ALPHA CEMENT changed to multiwalls of West Virginia's Clupak* Paper

When the new tougher Kraftsman Clupak paper was being introduced by West Virginia Pulp and Paper Co., the Alpha Portland Cement Co., Easton, Pa., major producer of Portland and mortar cements, did its own testing.

This was only natural for a leading company in the industry—with eight plants in the East, Midwest and South. Alpha's president, Robert S. Gerstell, foresaw the tremendous possibilities of Kraftsman Clupak paper, especially in terms of customer satisfaction and operating economy. With his guidance, Alpha was the first major cement company fully to realize the potentials of this new West Virginia paper!

Alpha's purchasing agent, James I. Maguire, directed the test program which compared Alpha's then current, natural kraft multiwalls with bags made of the new Kraftsman Clupak, the paper with built-in stretch.

Filling, handling and shipping were all examined. On every count, the new Kraftsman Clupak paper bag proved its superior toughness!

Construction of the natural kraft bags, to carry 94# of Portland cement, was 2/40, 2/50 totalling 180# paper basis weight. The new Kraftsman Clupak bags were 1/50, 1/50, 1/50 totalling 150# paper basis weight. Savings on the paper basis weight reduction of 30# amounted to $2.75 per M bags.

But more important—bag breakage in shipments of both Portland and mortar cement has become negligible! And complaints from supply dealers have been reduced to a minimum.

Today, virtually all multiwalls used by Alpha, from whatever supplier, are made of Kraftsman Clupak paper. And naturally, Alpha is using West Virginia's own bag, called WONDERWALL.

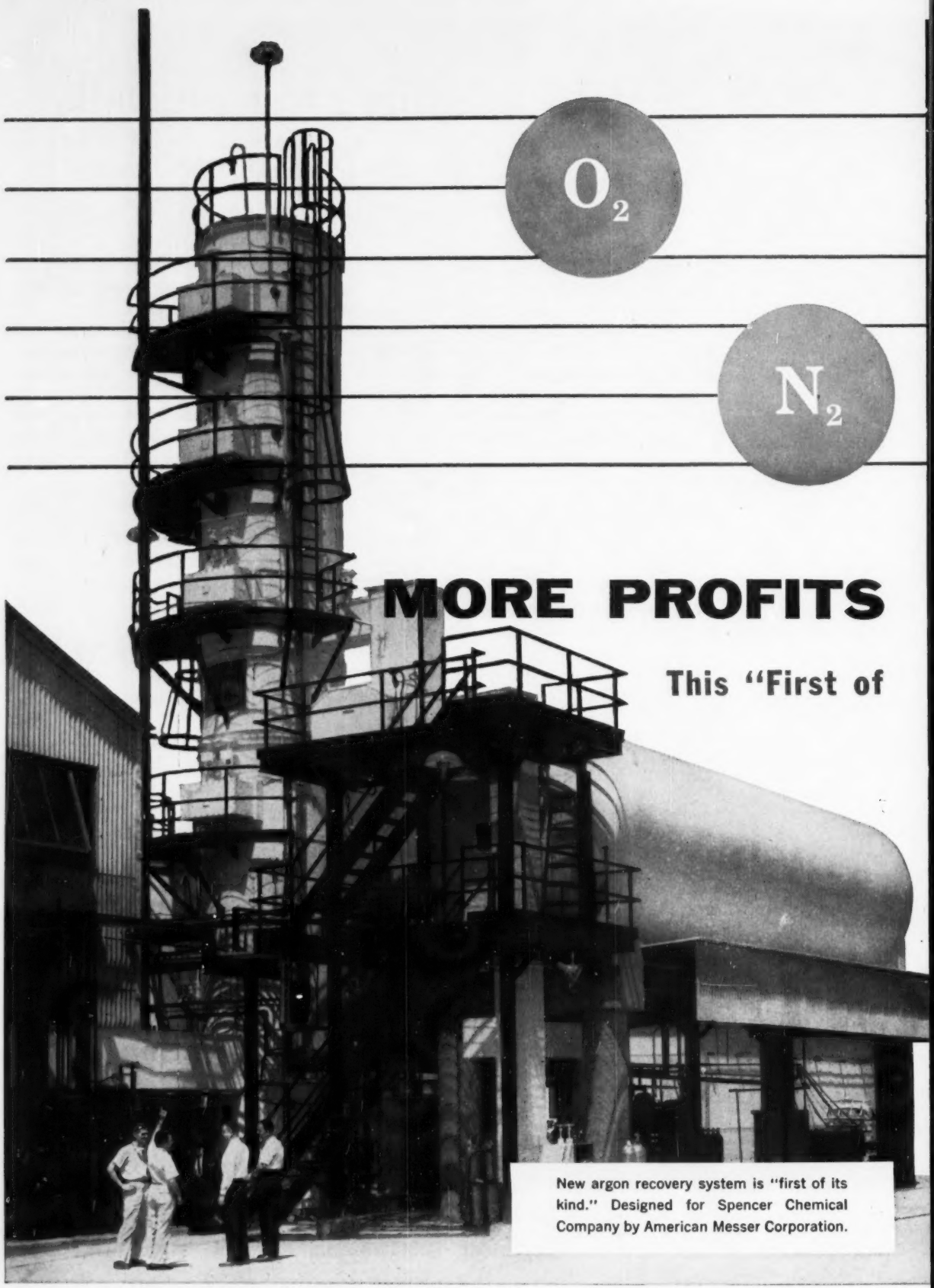
If you pack fertilizer, feed, cement, flour, chemicals or like products, see how you can *cut costs* and satisfy customers *better* with WONDERWALL. Write Multiwall Bag Division, West Virginia Pulp and Paper Company, 230 Park Avenue, New York 17, N. Y.

West Virginia Pulp and Paper

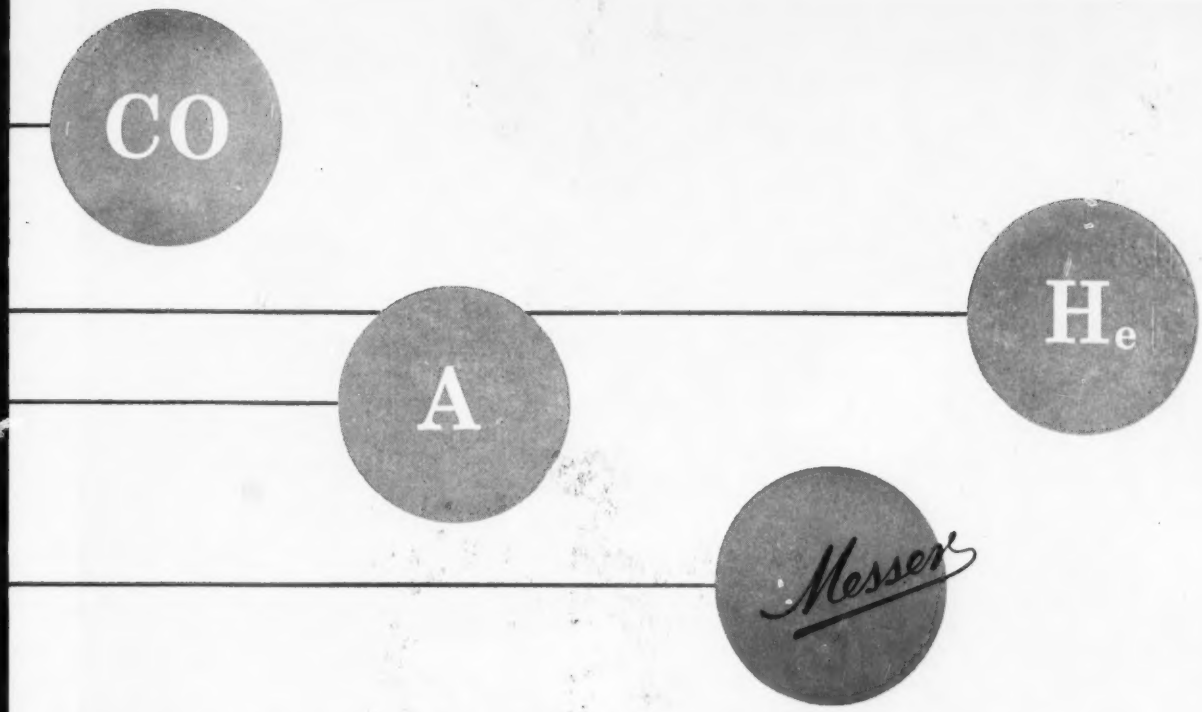
*Clupak, Inc.'s trademark for extensible paper manufactured under its authority.

TEST MASTER. James I. Maguire, purchasing agent of Alpha Portland Cement Company, says: "The success of bags made from Kraftsman Clupak paper, due to sheer toughness, was extraordinary from the start. They are not only tougher . . . they make possible realistic savings in bag costs."

WONDERWALL PROVING GROUND #1. Actual handling of WONDERWALLS and other bags made with Kraftsman Clupak paper—in comparison with the old, natural kraft multiwalls—proves the superiority of Kraftsman Clupak paper. No problems with filling, opening, stacking or shipping.



New argon recovery system is "first of its kind." Designed for Spencer Chemical Company by American Messer Corporation.



IN AIR SEPARATION?

Its Kind" Plant May Give YOU Some New Ideas

How to make an air separation plant more profitable is illustrated by a recent accomplishment of Spencer Chemical Company. Through a new cryogenics system, Spencer now turns out substantial quantities of Argon from its Vicksburg, Miss. operation originally designed for making ammonia.

Spencer Selects American Messer

Spencer asked American Messer to investigate the possibilities of augmenting the ammonia plant's facilities to manufacture argon. Messer went to work. It undertook the design of a unique process to achieve the results Spencer was seeking.

What happened? Today this Vicksburg plant produces 3,000,000 cu. ft./mo. of ultra-pure argon from what was formerly a waste stream from the syn gas nitrogen scrubbing section of the ammonia operation.

This method permits much higher recovery of argon from the ammonia producing process than was previously possible by air separation techniques. Yet it in no way influences or upsets the balance of oxygen and nitrogen production important to the basic function of the plant-making ammonia.

Interested In Oxygen, Nitrogen, Argon, Helium?

American Messer is equipped and ready to consult with anyone whose manufacturing process could benefit from a more efficient and economical use of cryogenic processes. Be sure of the finest technical counsel! Your inquiry will be welcomed. American Messer Corporation, Chrysler Building, 405 Lexington Avenue, New York 17, N.Y.

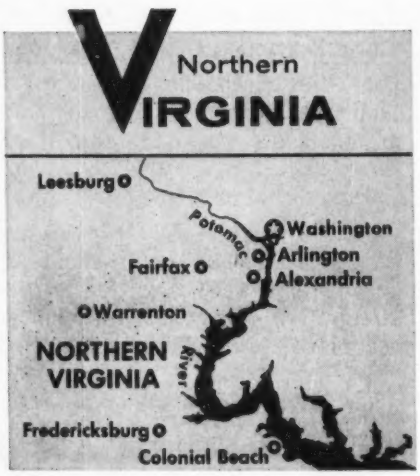
VISIT US—at the 27th Exposition of Chemical Industries, Space No. 1083. New York Coliseum, Nov. 30—Dec. 4

AMERICAN MESSER CORPORATION

You can see Washington Monument from our new lab...

There couldn't be a righter spot than Northern Virginia for your new research center, pharmaceutical plant or other light industry. It's close to the facilities of the Nation's Capital. And skill runs high among a population with an educational level 30% above the U. S. average.

Vepco knows this area intimately. Because Vepco serves it with dependable and abundant electric power . . . 1,700,000 kilowatts of capability now, due to exceed 2,000,000 kilowatts by 1961. For more facts, or confidential site-finding help in this land of mild climate and pleasant living, write or phone today.



50 YEAR 1909-1959

VIRGINIA ELECTRIC and POWER COMPANY

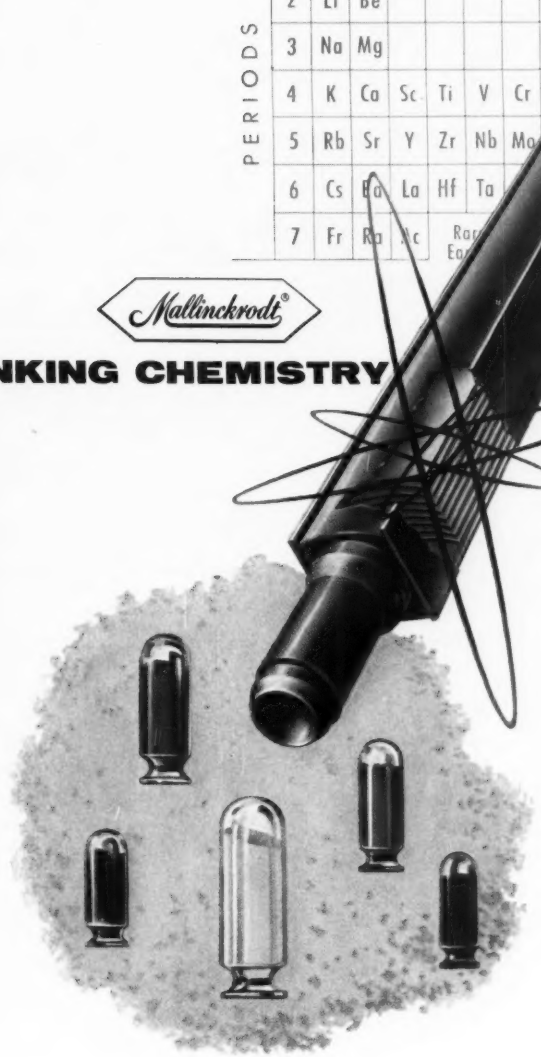
Serving the Top-of-the-South . . in Virginia, West Virginia and North Carolina

Clark P. Spellman, Mgr., Area Development, Electric Bldg., Richmond 9, Va., MI 9-1411

PERIODIC CLASSIFICATION OF THE ELEMENTS

GROUP	I_a	II_a	III_b	IV_b	V_b	VI_b	VII_b	$VIII_b$			I_b	II_b	III_a	IV_a	V_a	VI_a	VII_a	$VIII_a$
PERIODS 1	H																	He
2	Li	Be											B	C	N	O	F	Ne
3	Na	Mg											Al	Si	P	S	Cl	Ar
4	K	Ca	Sc	Ti	V	Cr	Mn				Cu	Zn	Ga	Ge	As	Se	Br	Kr
5	Rb	Sr	Y	Zr	Nb	Mo				Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
6	Cs	Ba	La	Hf	Ta					Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
7	Fr	Ra	Ac	Ra Ea														

Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	



Mallinckrodt®

LINKING CHEMISTRY TO INDUSTRY

HOW MALLINCKRODT'S SPECIAL SKILLS SERVE THE NUCLEAR INDUSTRY

Mallinckrodt helped pioneer the atomic age in 1942 . . . by producing the first tonnage quantities of purified uranium compounds.

Today, the specialized technical skills developed by Mallinckrodt have been successfully applied to the task of producing nuclear fuel for the world's power reactor programs.

Uranium compounds of many types and in varying enrichments (all required by the industry) are being produced in a Mallinckrodt plant at Hematite, Missouri. This plant was the first of its kind owned by private industry.

Mallinckrodt is dedicated to meeting the present and future fuel material requirements of the nuclear power industry.

Mallinckrodt's special skills in chemical manufacturing contribute to progress in many industries.

Mallinckrodt's experience,
facilities and ingenuity
can be part of your future.
Contact our technical people.

BULK PHARMACEUTICALS • INDUSTRIAL CHEMICALS
LABORATORY CHEMICALS • COMMERCIAL URANIUM
TURF FUNGICIDES • MEDICINAL PRODUCTS

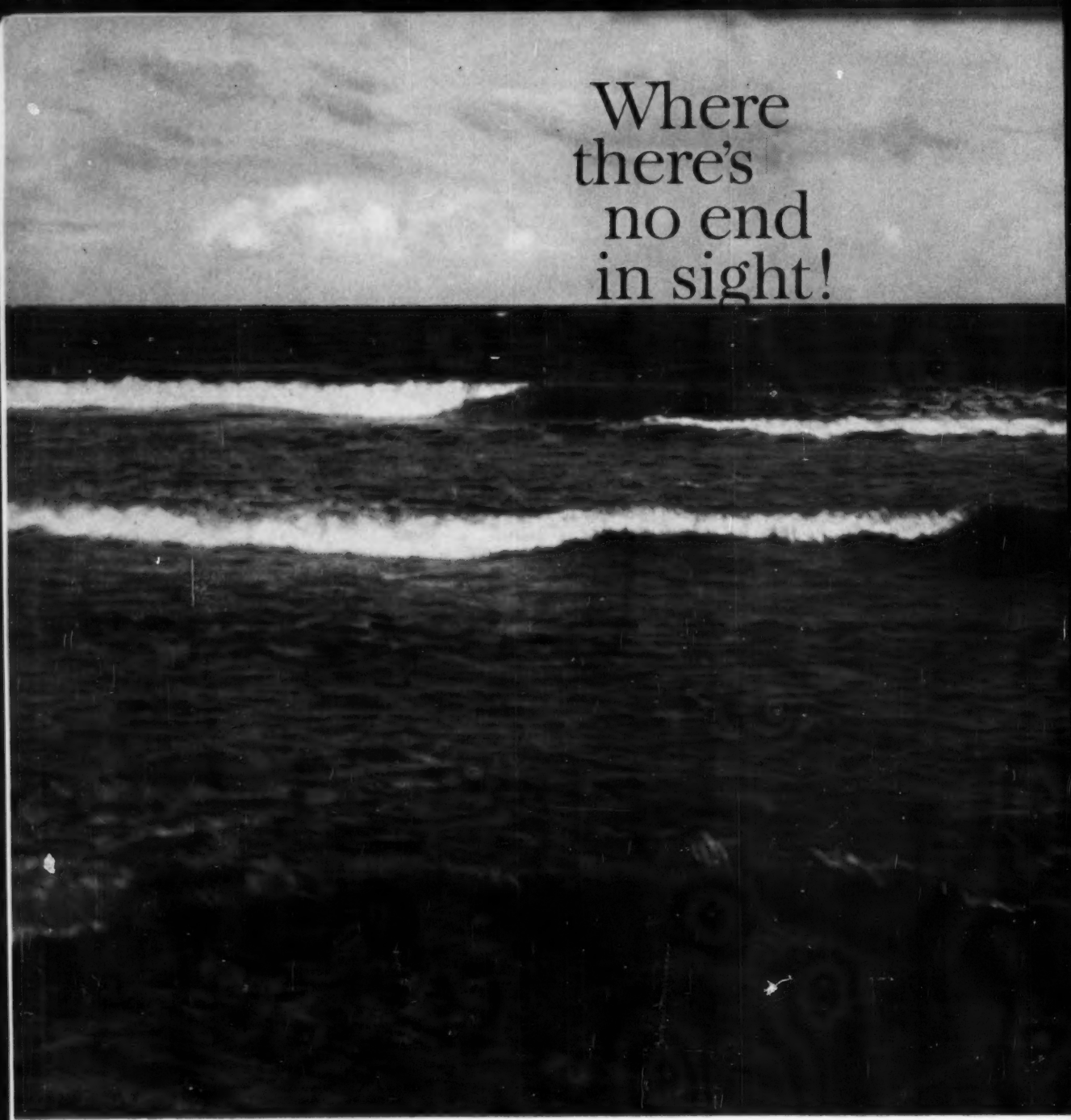
Mallinckrodt®

MALLINCKRODT CHEMICAL WORKS

St. Louis 7, Mo. **New York 8, N. Y.**

CHICAGO • CINCINNATI • CLEVELAND • DETROIT • LOS ANGELES
PHILADELPHIA • SAN FRANCISCO • MONTREAL • TORONTO

TODAY WE MEET OUR STANDARDS—TOMORROW WE EXCEED THEM. AFTER 91 YEARS, IT'S A HABIT.



Limitless . . . the opportunities for discovery, invention, improvement. That's the thinking behind Conoco chemicals . . . making them superior in every way!

Today, more and more manufacturers are relying on Conoco for a diversity of fine chemicals. Included in the Conoco line are anionic and cationic detergent intermediates, water-soluble sulfonates, oil-soluble sulfonates, petrolatums, white oils, secondary plasticizers for vinyl resins, fluid-loss additives, viscosity depressant, and ethylene oxide.

For chemicals with a head start on the future, count on Conoco!

CONOCO

CONTINENTAL OIL COMPANY, PETROCHEMICAL DEPARTMENT
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Business Newsletter

CHEMICAL WEEK
November 14, 1959

The steel strike will depress '59 chemical sales totals, despite last Saturday's back-to-work injunction. Just how hard and for how long the chemical industry will suffer from the strike's effects is still cloudy. Allied Chemical's experience and outlook is probably typical of the whole industry's.

Because of the strike, Allied no longer expects record earnings this year. The pinch began in the third quarter, and Allied's comptroller, Frank Linton, expects it will be more marked in the figures for October and early November. Even if the strike is settled, Linton says, it's anybody's guess how long it will take for chemical users to start reordering. Allied's sales, he thinks, will still set a record this year, and exceed $700 million. Earnings should go over $5/share, but they won't hit the record $5.28/-share level of '55.

Following the industry pattern *(see p. 39)*, Allied trimmed capital expenditures this year to about $42 million, significantly less than last year's $58.5 million. Next year they will probably reach $60 million, could go "considerably higher," depending on the progress of several still-unauthorized projects.

Two good bets for Allied expansion: nylon-6 and polyethylene. Nylon operations have "turned the corner into profitable operation," Linton says. Polyethylene expansion plans center on resin for pipe and other industrial uses, although Allied is also working on modifications for use as a molding compound.

A polypropylene venture may lie ahead for Allied. It has developed a process, but the hazy patent situation is holding off a decision

•

Add another producer of polypropylene fiber: Industrial Rayon Corp. (Cleveland) plans semicommercial production of "Prolene" staple fiber, tow and continuous filament yarns from Hercules Powder Co.'s resin. Other producers of polypropylene fiber to date: Montecatini (Italy) and Reeves Bros. (New York).

•

Petrochemical operations are fanning out northward after long being overwhelmingly concentrated in the Southwest. Two major moves in the news:

Dow Chemical's big new Saginaw Bay Division petrochemical complex at Bay City, Mich., is ready to roll, with some linear polyethylene already being produced in a rated 24-million-lbs./year plant. (Ultimately, the works will also produce polypropylene, as well as propylene-ethylene and propylene-butene copolymers.) The plant now has an ethylene capacity of 300,000 lbs./day and an estimated 200,000 lbs./day of propylene. Also made at the same site: "substantial quantities" of butadiene, which Dow

says it hopes to use captively. Ethylene and propylene not consumed at Bay City will be piped to Midland.

The new complex uses straight-run refinery products that the division's Bay Refining Co. gets from local Michigan wells, as well as from its tap on the Canadian pipeline from Alberta to Sarnia, Ont.

•

And Gulf Oil is planning a major chemical complex in Philadelphia—another move in the petrochemical buildup along the Delaware River valley. Immediately slated: a $10-million oxo-alcohol plant and related facilities, to go up on the 100-acre site acquired from the city.

This isn't the first big petrochemical venture for the Delaware Valley. The area's closeness to key markets and large refineries has already attracted AviSun (Sun Oil and American Viscose subsidiary)—it has a $2.5-million polypropylene plant at New Castle, Del.; SunOlin (subsidiary of Sun Oil and Olin Mathieson), which expects to have its $8-million urea plant in operation early next year, and possibly a major Shell venture at its Riverton, N.J., site.

And Canada is developing a long-range petrochemical potential. A planned $2-billion program to bring more natural gas to both industry and home is a direct result of the Trans-Canada pipeline being built. Under construction: a $2.5-million compressor station, north of Toronto, Ont. (with three others also planned in the province) and a spider web of feeder lines. A prediction from N. I. Wilson, manager of the Canadian Gas Assn.: $100 million will be spent in western Canada on petrochemical development within the next few years.

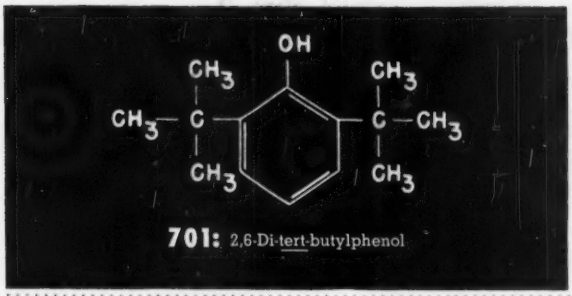
In Alaska, the attraction of petrochemicals, carbon black and other industries is pinpointed by the proposed $12-million gas pipeline from the Kenai Peninsula (80 miles south of Anchorage) deposits.

The 12-in. diameter pipeline will extend 165 miles. It is foreseen the plants could be set up for local manufacture of basic petrochemicals and such products as glass, paints, ink and plastics.

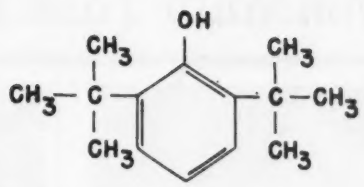
•

Between-session discussion at International Rubber Conference in Washington this week may center around a series of new developments both in chemical components and physical characteristics of tires. One of the latest: Naugatuck Chemical Division of U.S. Rubber plans large-scale production of an antiozonant-antioxidant chemical, Flexzone 3-C (N-isopropyl-N′-phenyl-*p*-phenylene diamine), said to combat effects of both ozone and oxygen on tires. Construction of the new production unit will begin next month at the division's main plant in Naugatuck, Conn.

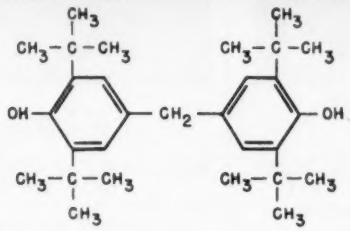
And a brand-new tire concept introduced by Pirelli of Italy has just been revealed: tread in three replaceable bands that can be changed in five minutes. The tread can be different polymer from the carcass, offering wider possibilities in selection of optimum composition. And Dunlop Tire & Rubber Co. is considering production of a new type of tire at its Buffalo plant. This tire has steel mesh embedded beneath its surface tread. Advantage? Better cornering at higher speeds.



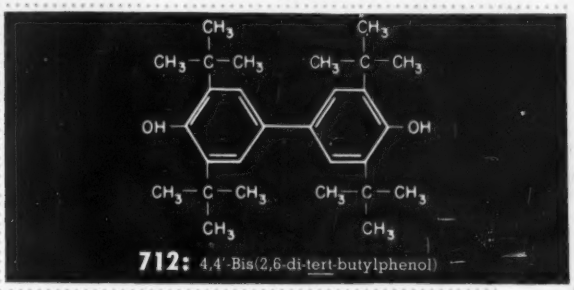
701: 2,6-Di-tert-butylphenol



733: Mixed tert-butylphenols (75% min. of 2,6-di-tert-butylphenol)



702: 4,4'-Methylenebis(2,6-di-tert-butylphenol)



712: 4,4'-Bis(2,6-di-tert-butylphenol)

which of these "ETHYL" antioxidants can help YOU

One or more of these versatile antioxidants may be helpful in your research on petroleum, rubber, plastics, or other products

701, 702, 703 and 733 are commercially available; the others can be obtained in development quantities.

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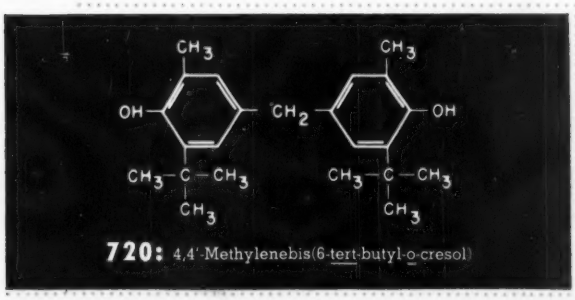
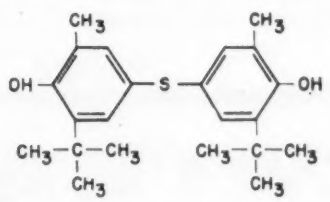
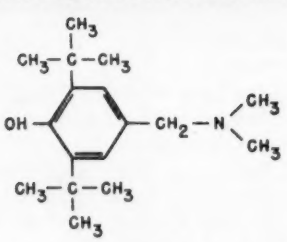
ETHYL CORPORATION OF CANADA LIMITED, TORONTO • **ETHYL USA (EXPORT)** NEW YORK 17, N.Y.



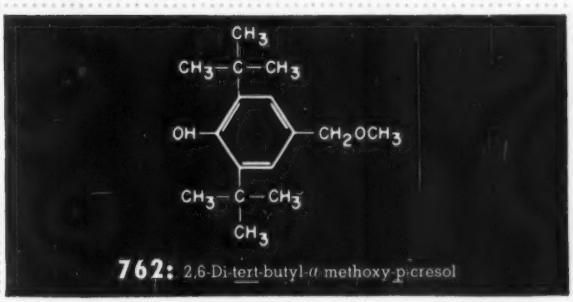
720: 4,4'-Methylenebis(6-tert-butyl-o-cresol)



736: 4,4'-Thiobis(6-tert-butyl-o-cresol)



703: 2,6-Di-tert-butyl-α-dimethylamino-p-cresol



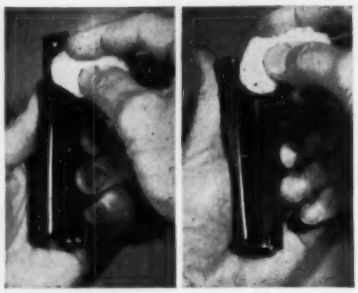
762: 2,6-Di-tert-butyl-α methoxy-p-cresol

Monsanto Task Force Chemicals...

Actamer, Santobrite, Santophen 1

CONQUER MICROORGANISMS FOR "GERMPROOF" PAINTS, COSMETICS, WALLBOARD, LAUNDRY

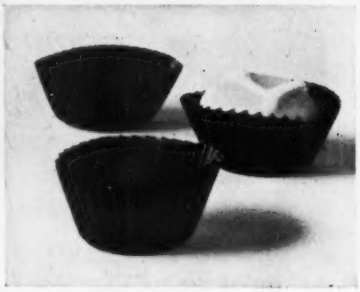
Today, "germproof" has become a magic selling word for companies that market products to a germ-conscious public. Monsanto supplies a line of compounds that destroy, disarm, or discourage microorganisms for "germproof," "odorfree," "spoilage-proof" products. Examples: SANTOBRITE, widely used to make non-spoiling, germ-discouraging wall paint, moldproof cellulosic insulation and wallboard; also used in solution form in laundry rinsing to prevent molding of wet-stored linens, a benefit that soon may be combined with bleaching and starching... SANTOPHEN 1, another low-toxicity-to-humans compound, combines surprising mildness to the skin with the highest potency for killing *staph* organisms ... ACTAMER, soap and cosmetic bacteriostat, now finding new uses for controlling bacteria-caused odors in a variety of sun-tan cremes and feminine hygiene preparations; also attracting interest for use in paper to make "antiseptic" wrappings.



Sulfasan R

ECONOMICAL VULCANIZING AGENT GIVES RUBBER HIGHEST HEAT RESISTANCE—ENDS BLOOM

You can give your rubber products good heat resistance—at a reasonable cost—and eliminate unsightly bloom by partial replacement of conventional curing agents with SULFASAN R. This unique vulcanizing agent also provides greater safety from scorch and can boost modulus, reduce compression set and improve aging. In some compounds it trims the cost by reducing the total amount of vulcanizing agent required. As little as 0.8 to 2 parts of SULFASAN R per hundred of rubber, plus a small amount of THIURAD (tetramethylthiuram disulfide), is usually sufficient to achieve good results in GR-S, butyl, nitrile and natural rubbers. And SULFASAN R is non-discoloring; it can be used in white and light-colored stocks.



Vanillin

GIVES PAPER A BETTER SMELL FOR GREATER "SELL"

Paper makers and paper converters are finding that the faint, pleasing odor of vanillin helps them gain a better competitive position. Vanillin hides the natural boxboard or paper odor—imparts a light, fresh cookie-like fragrance. By offering the pleasant smell as an "extra" benefit—paper marketers are gaining business in bakery wrap and bags, in paper and paperboard for drug packaging, in candy wrap, and even boxboard for packaging kitchen utensils. Application is simple: a faint powdering or a mist-spray of vanillin solution in water gives paper or board a mild, pleasing aroma that is stable in odor character and long lasting.

Mission today: **A DISTINCT**

MONSANTO CAN PUT A TASK FORCE OF CHEMICAL "SALES-ADVANTAGE BUILDERS" AT YOUR COMMAND

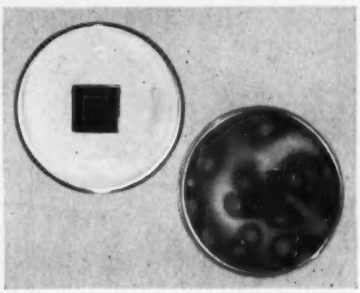
Want a Distinctive Difference That Sells ... flame resistance? lower cost? "germ proofness"? a pleasant odor? better appearance? Whether your "consumer" is the American family or a special industrial market, most of your prospective buyers are looking for plus values and extra benefits like these. Here are some Monsanto materials that impart this type of competitive edge to a variety of products. Perhaps the sales advantages in these applications, or others that occur to you, can be developed in your particular product. Why not check into the possibilities right now while you're thinking about it. Write to: Monsanto Chemical Company, Task Force Chemicals, Dept. C, St. Louis 66, Missouri.

Orthonitrochlorobenzene

BASE FOR A VARIETY OF LOW-COST AROMATIC END PRODUCTS

Marketing advantage: good quality at the lowest price. For the diversified-organic-chemical maker, *o*-NITROCHLOROBENZENE can be one of the cheapest starting materials to a whole variety of substituted aromatics with specialized commercial uses that could represent significant markets. Its highly reactive chlorine is the key to creative synthesis. Ordinarily, an aromatic linked chlorine atom *will not react* in displacement-type reactions. In ONCB, however, the $-NO_2$ radical makes the chlorine in the ortho position highly reactive. Dozens of substituents can be readily fixed to the ring (with high yields) in place of the chlorine atom. The cost of the starting material in tank car quantities is so low that ONCB can be converted with a variety of low-cost reactants to make a large number of other substituted aromatics that serve dozens of specialized uses. This makes ONCB a prime starting point for custom specialty manufacturers.

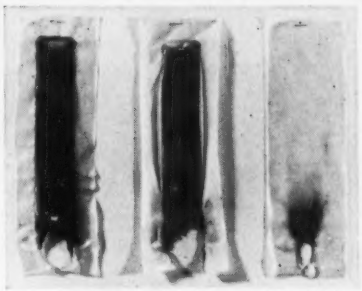
(For a route map to over a hundred compounds, request a copy of ONCB derivatives chart.)



p-Toluenesulfonamide

FREES PROTECTIVE COATINGS FROM MILDEW AND FUNGUS ATTACK

In varnish or paint films, *p*-TOLUENESULFONAMIDE imparts unusual protection to damaging attack by microorganisms. Although many compounds show fungicidal ability, most are inactivated by incorporation into varnish or paint. *p*-TOLUENESULFONAMIDE maintains its fungicidal power, even when blended—kills fungus as shown in test above. It is readily compatible with varnish vehicles, and as little as 2% makes the films mildew-proof. Two-year exposure tests in the jungle under hot, humid, tropical conditions showed that test ropes impregnated with a good spar varnish (phenolic resin and tung oil) containing *p*-TOLUENESULFONAMIDE were free of the damaging fungal attack that virtually destroyed the controls. A white crystalline powder, *p*-TOLUENESULFONAMIDE is free-flowing, inexpensive and nonirritating. One fast-growing application: electronic equipment coatings. Signal and electrical control equipment often fails in hot, humid environments due to fungal growth on the units. Varnish films containing *p*-TOLUENESULFONAMIDE give such electrical equipment complete protection.



Santicizer 141

MORE EFFICIENT PHOSPHATE-TYPE PLASTICIZER BOOSTS FLAME-RETARDANT VINYLS

To provide film, sheeting and coatings with the distinctive feature of flame resistance, most vinyl processors now select SANTICIZER 141. It improves light stability, tear resistance and low-temperature flexibility. Films using it may have as much as 50% more tear strength than films plasticized with straight DOP. And SANTICIZER 141 is a *low-cost, nontoxic* primary plasticizer. It has low volatility, good resistance to solvent and water extraction, excellent resin compatibility and practically no odor. For upholstery, tents, tarpaulins and covers, belting, tapes, rainwear, coatings, films and other vinyl products where flame retardance promotes sales, be sure you check out SANTICIZER 141.

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- ☐ ORTHONITROCHLOROBENZENE
- ☐ *p*-TOLUENESULFONAMIDE
- ☐ SANTICIZER 141

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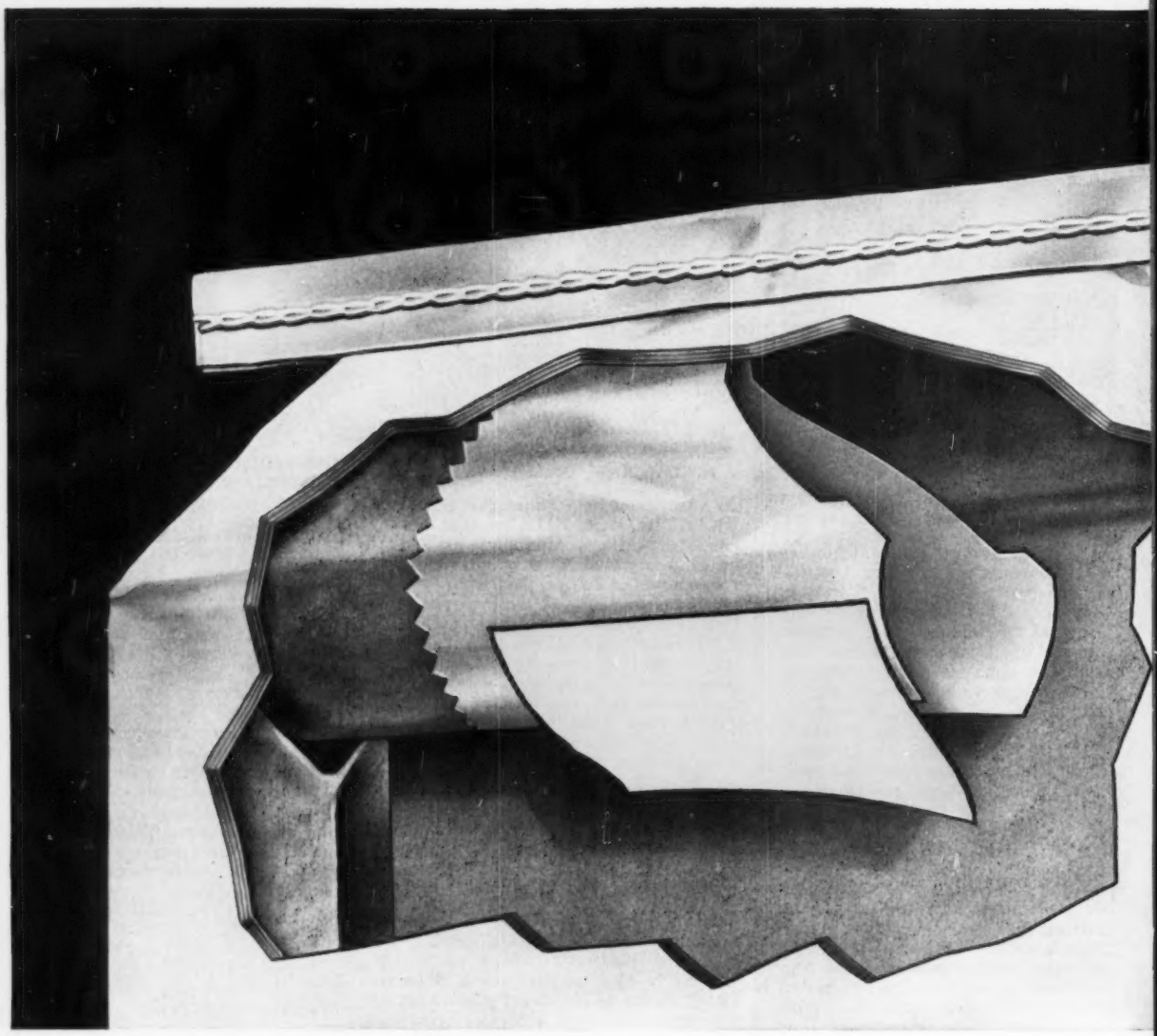


. . . Magic Yellow sewn

An ALL-NEW concept in valve construction . . . "DUETTE" is actually *two valves in one* with a DOUBLE CHECK ACTION. Thoroughly tested and proved siftproof, without packing trouble.

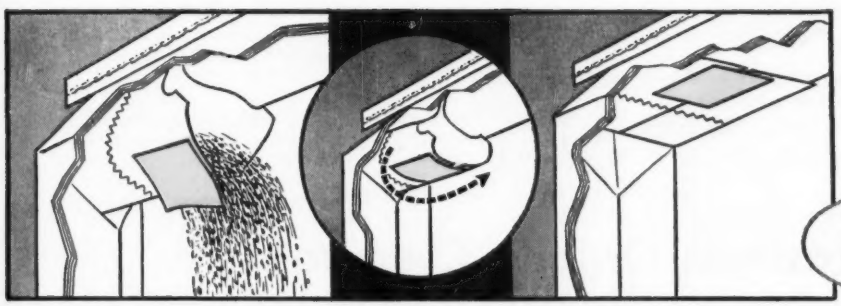
There's never been a sewn multiwall valve like it. It's NEW . . . not just another way of shaping, creasing, notching or slitting . . . but an *addition* that acts as a valve-on-a-valve, giving double sift protection.

Bemis "DUETTE" Valve Multiwalls, tested in full-scale production for over two years, have proved their superiority over other sleeve valve bags for a wide variety of products—granular, pelletized or pulverized.

Try the Bemis "DUETTE." You'll be delighted with the results.

Write us for the *complete* story, or ask your Bemis Man. Samples on request.

multiwall sleeve valve



WON'T CLOG . . . This view shows how the Magic Yellow check flap falls freely aside from the valve slit, giving no interference whatever to proper operation of the packing spout. The sleeve won't choke or clog the packer.

POSITIVE CLOSING ACTION . . . This diagrammatic picture shows action as the flap starts to close over the valve slit.

CAN'T SIFT . . . When the bag is filled, the Magic Yellow flap, acting as a check valve, *completely overlaps and covers* the valve slit, keeping the product from reaching the place where it might find a chance to sift.

Bemis

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408 Pine Street, St. Louis 2, Missouri
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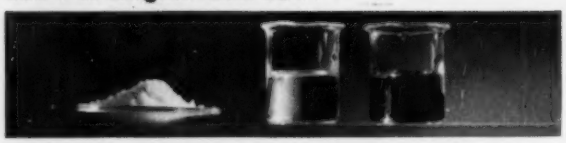
...AMONG SOME 3700 ORGANICS

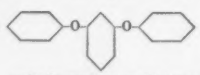
600°F is tougher than 350°F



To demonstrate how passably these two liquids and this solid perform as oxidation-, corrosion-, and radiation-resistant lubricants for gears and bearings operating up to 600°F in flying objects and other up-to-date kinds of machinery must have taken a tidy chunk of government money. We can cluck like a frugal taxpayer, since only a pittance found its way into our pockets.

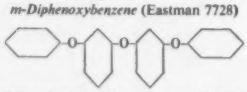
Now that the pure, undoctored, unsubstituted meta-linked polyphenyl ethers are revealed to rate high for chemical sturdiness, lubricity, and retention of the liquid state over a broad temperature range, we make our contribution by enabling the experimenter to acquire them in a small, quiet commercial transaction without diplomatic maneuvering.

For $8.80 for 25 grams



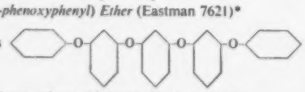
m-Diphenoxybenzene (Eastman 7728)

For $18.45 for 10 grams



Bis(m-phenoxyphenyl) Ether (Eastman 7621)*

For $12.45 for 10 grams



m-Bis(m-phenoxyphenoxy)benzene (Eastman 7815)

Perhaps one of our markets for these polyphenyl ethers will be for use as foils against which to demonstrate the superiority of new classes of lubricants as yet unrevealed, just as the polyphenyl ethers stand up for many hours to conditions that devastate 350°F lubricants to stiff sludges or vapors in minutes. Two decades ago, when we were in the high-vacuum business and considered ourselves pretty smart in diffusion pump liquids, we developed some phlegmatic esters that now serve as the goats for the polyphenyl ethers to beat.

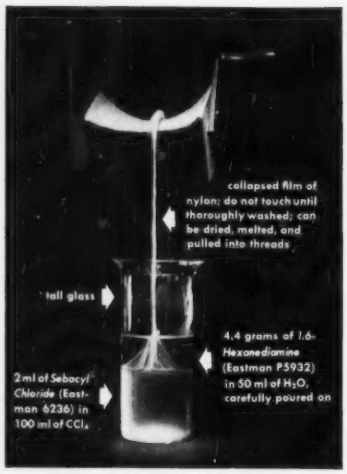
Alkylsulfonyl from different viewpoints

A gentleman of Oak Ridge called to our attention a paper (*J. Chem. Soc., 1957*, 2420) which, in the course of examining 29 different alkylsulfonates, reports ethyl methanesulfonate as one of four which effectively inhibit a transplanted rat carcinoma. Previously Haddow and Ross (*Nature, 177*, 995) had reported that this particular compound has the striking feature of greater efficiency when administered orally in aqueous solution (20 mg/rat/day) than by daily injection of the same solution. The sequence of ideas which led Haddow and Ross to this finding is interesting.

The initial idea was that chloroethylamines are potential tumor-growth inhibitors. The second idea was to use the compound 2-chloroethyl methanesulfonate as a reagent for chloroethylating an amino group under mild conditions. The third idea was to run this reaction *in vivo* instead of *in vitro*. This actually worked. 2-Chloroethyl methanesulfonate proved an effective inhibitor in the rat both intraperitonally and orally, and it induced no significant depression of bone marrow.* The fourth idea was to write 2-chloroethyl methanesulfonate as $CH_3SO_2OCH_2CH_2X$ and vary the X from Cl to something else. With X as fluorine, cytotoxic activity persisted. The big surprise must have come with X = H, the unsubstituted ethyl methanesulfonate, the one that works better orally. This shifted the spotlight to the other end of the molecule, where dwells the methanesulfonyl group.

Our heads buzzing, we gave up trying to understand the basic biochemical issues. Our role is that of storekeeper; we must remember that. And what methanesulfonates did we have in the store? We had *n-Butyl Methanesulfonate* (Eastman 4671). (There had been requests for it. We haven't had time to track down why.) We went to work and put *Ethyl Methanesulfonate* on the stockroom shelf as Eastman 7830. Then, as a switcheroo, but with a certain seriousness of purpose, we made *Methyl Ethanesulfonate* (Eastman 7876). Perhaps someone will buy it who wants a deeper understanding of why the interchange of methyl and ethyl groups between the ends of the molecule depresses but does not destroy biological activity.

A polyamide condensation for the kids to watch but keep their little hands off


collapsed film of nylon; do not touch until thoroughly washed; can be dried, melted, and pulled into threads
tall glass
4,4 grams of 1,6-Hexanediamine (Eastman P5932) in 50 ml of H_2O, carefully poured on
2 ml of Sebacyl Chloride (Eastman 6236) in 100 ml of CCl_4

Du Pont, which does not ordinarily manufacture its nylon this way, was kind enough to publish this in J. Chem. Education *36*, 182. *We have been kind enough to prepare an abstract. Price for our minimum package quantities of the two reactants comes to $6.05. Teachers and Yuletide-bent daddies are reminded of the insidious nature of chlorinated hydrocarbons. Anyone inspired to commercial thoughts is advised to consult with his lawyer about U. S. Patent No. 2,708,617.*

Everyone who wants these or any of the approximately 3700 organic chemicals we stock (and catalog in Eastman Organic Chemicals, List No. 41) should get in touch with Distillation Products Industries, Eastman Organic Chemicals Department, Rochester 3, N. Y.

*There has been some 40° to 800°F talk about this one.

*Incidentally, it also proved powerfully mutagenic in *Drosophila*, giving an unprecedented high ratio of visibles to lethals, with strongest effects on the youngest germ cells.

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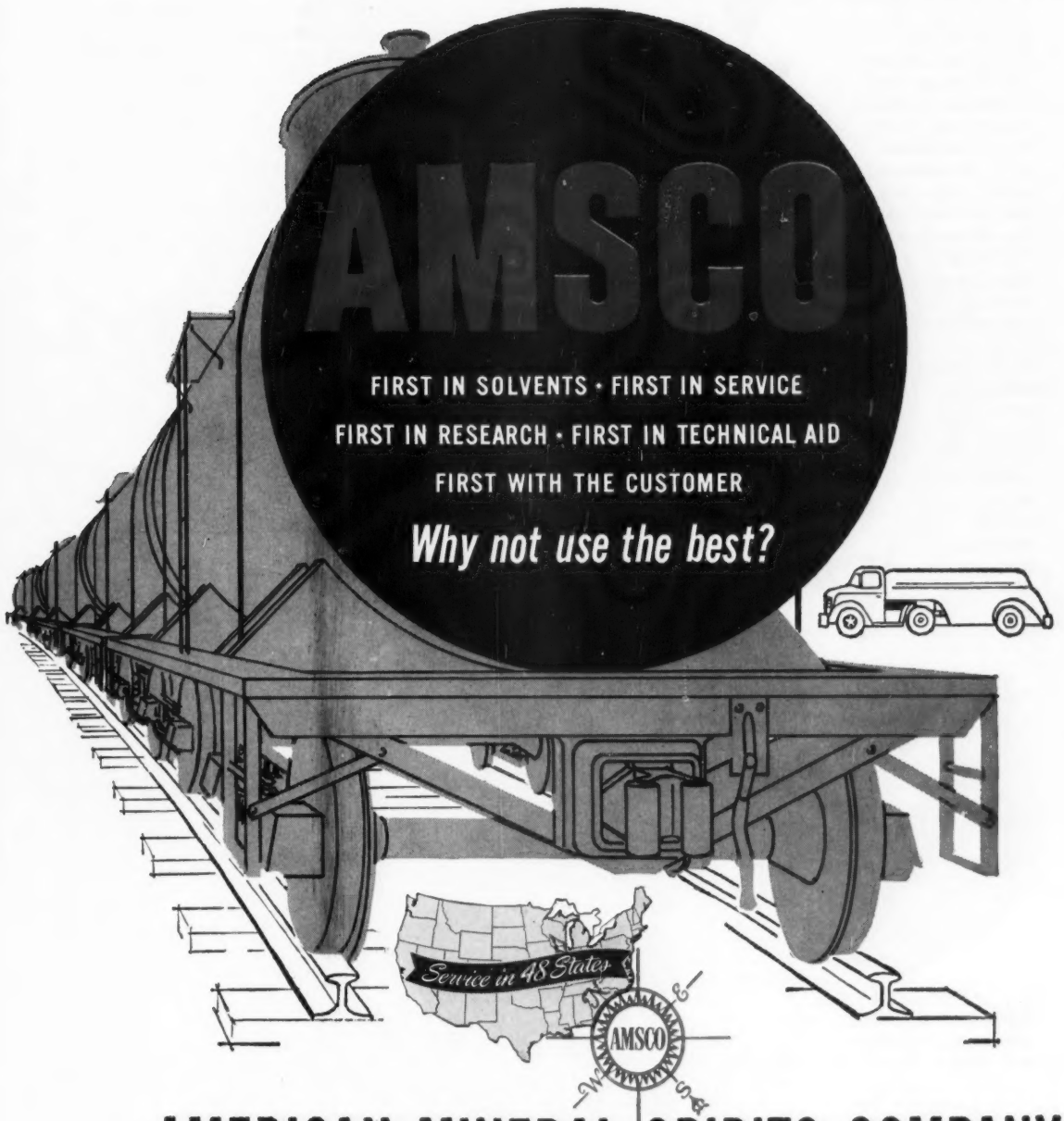
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NOVEMBER 14, 1959 **Vol. 85, No. 20**

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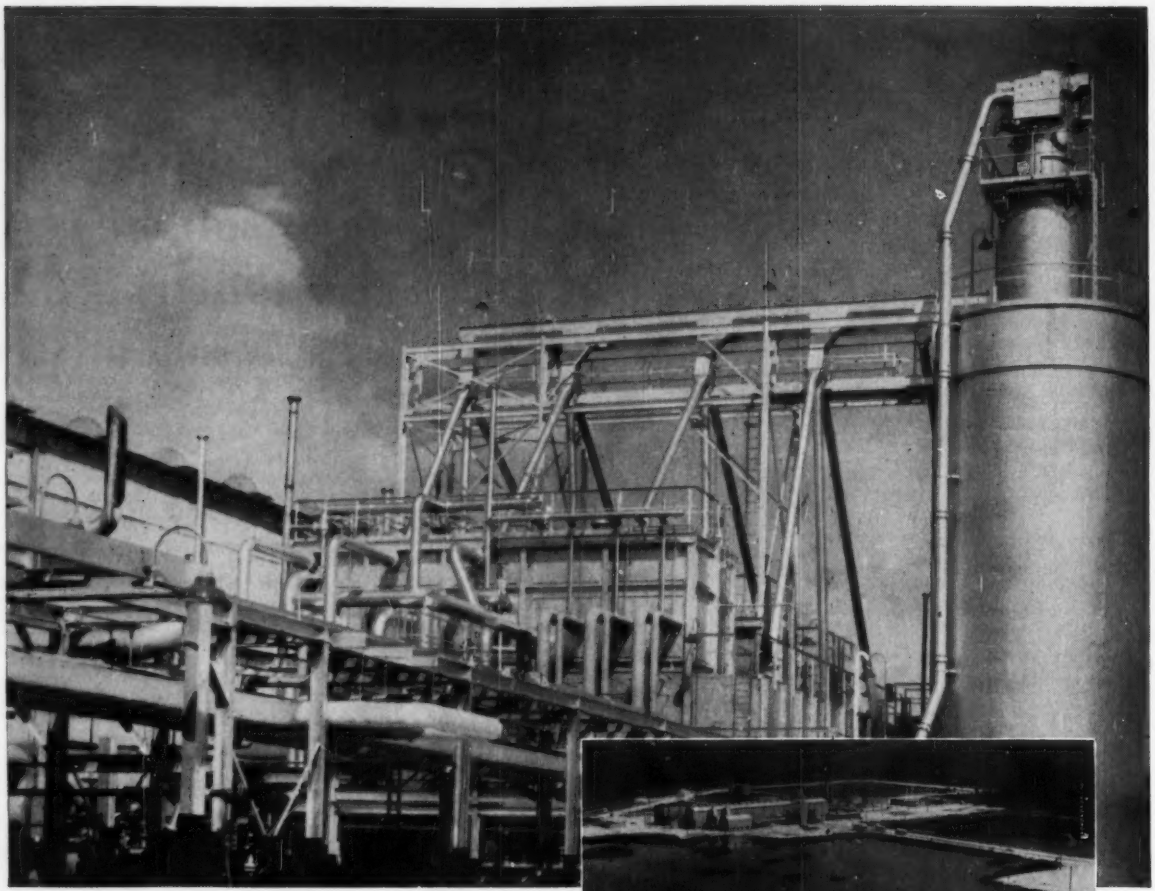

Liquid Hydrogen . . . ultimate rocket fuel . . . is made at this new Air Force Tonnage Facility at West Palm Beach, Florida. At center is the heart of the unit—the "converter cold box", where mixed ortho and para Hydrogen are converted to a high percentage of para form, which is highly purified and liquefied for storage.

The storage tanks in the foreground hold the world's coldest fuel—Liquid Hydrogen, at minus 423°F, for use in developing new missile and space engines. Plant can be seen in background.

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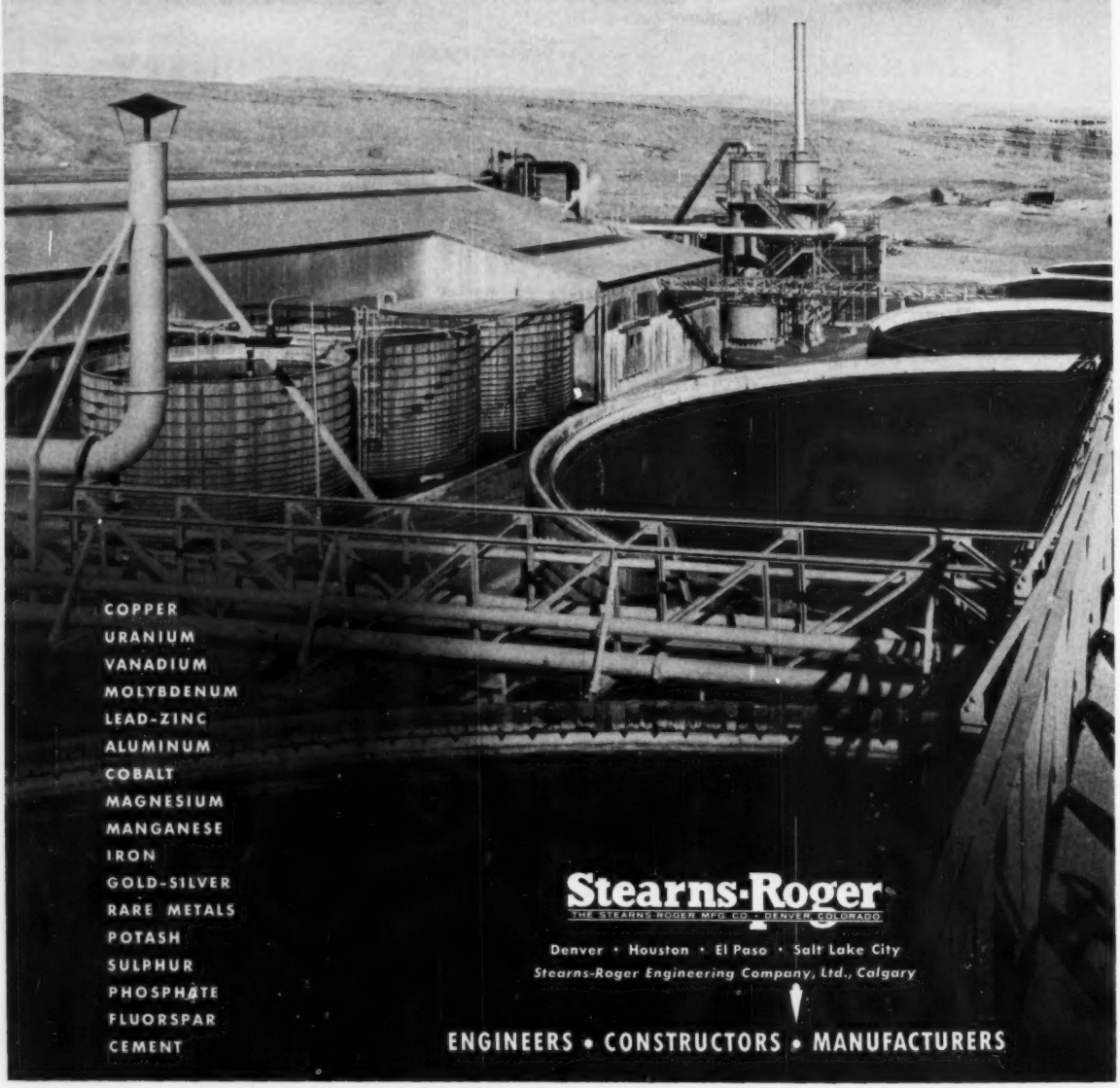

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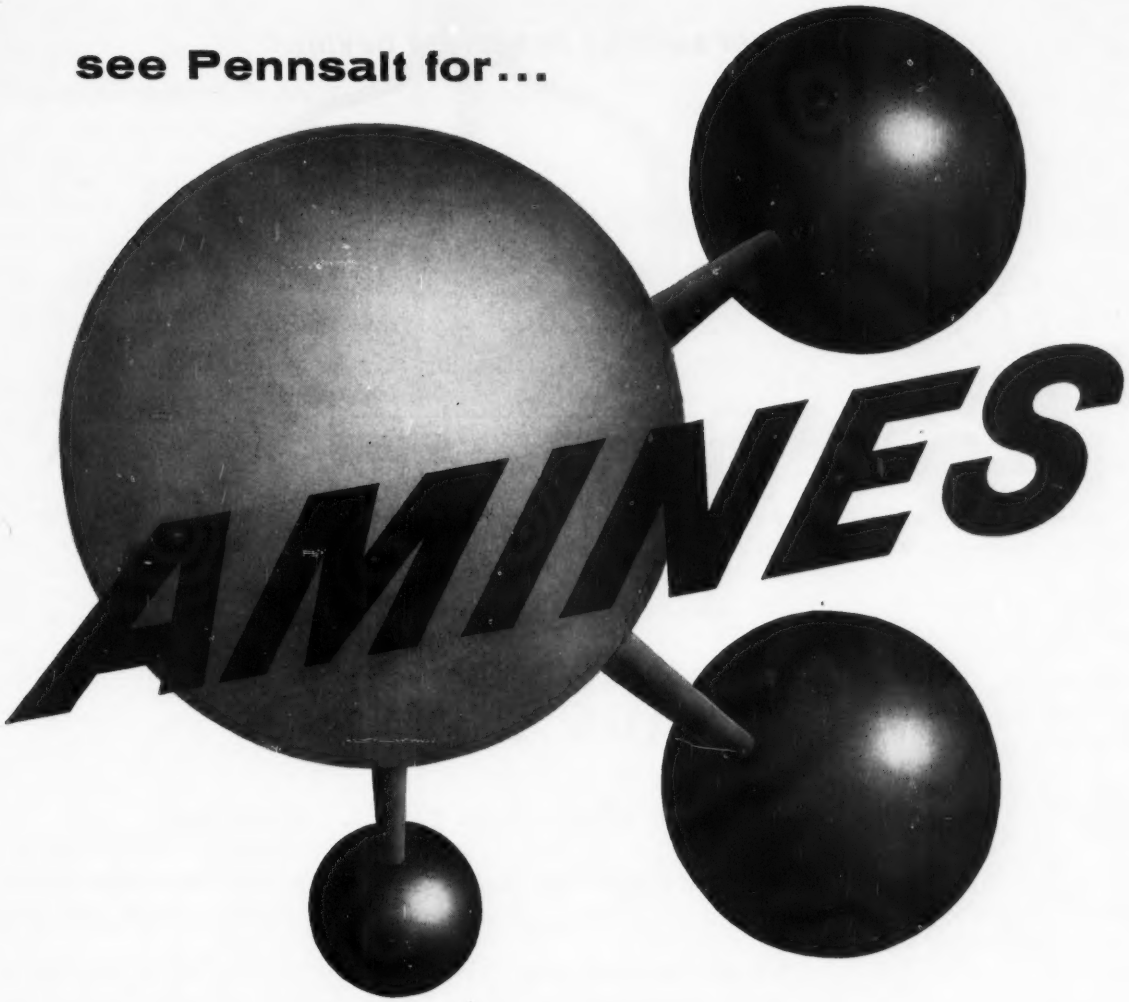

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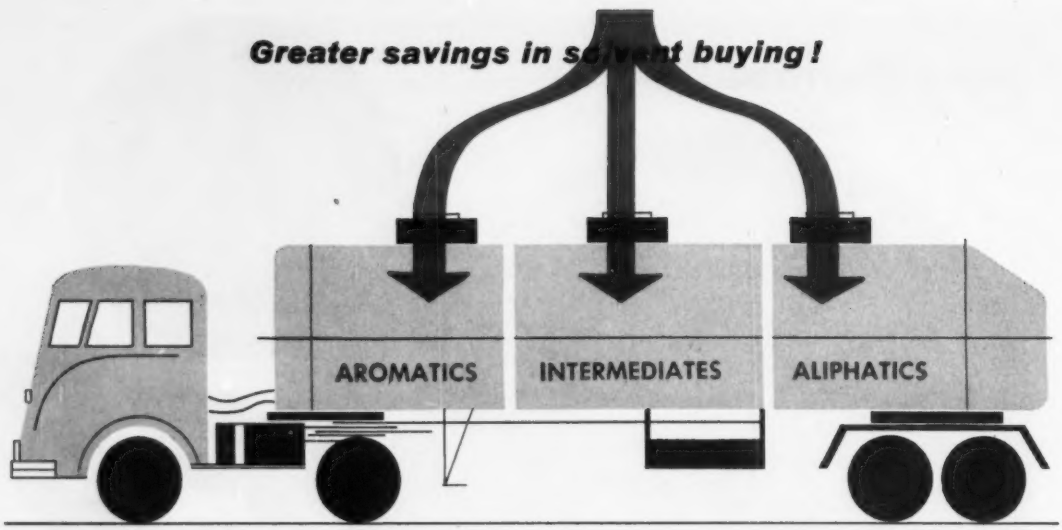

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OPINION

Raising Carbyne's Sights

TO THE EDITOR: The Technology Newsletter report (*Oct. 24*), regarding our new selective herbicide for wild oats, Carbyne, was, of necessity, so brief that it needs some amplification to prevent confusion about the status of this new chemical. Carbyne, if accepted for registration in Canada and the United States, will be marketed in the forthcoming season only on a limited basis. Full-scale commercial marketing will not be undertaken before 1961.

You report an "estimated cost: $3-5/acre" for using Carbyne to control wild oats in cereal grains. These figures reflect price estimates in full-scale commercial sales and represent maximum economic limit for wild oat control. However, developmental prices for the early marketing stages will be somewhat higher than this estimate.

HAROLD E. BINGHAM
Agricultural Chemicals Division
Spencer Chemical Co.
Kansas City

For the 'Littler Fellows'

TO THE EDITOR: We read with interest your article "Sorespots Spur Search for Conveyor Cures" (*CW, Sept. 26, p. 93*) and agree in general with the points made by the spokesmen for the manufacturers and users. . . .

It is our opinion, however, that more emphasis should have been placed on the point which was made by one chemical plant's chief engineer, who complained about the tactics of "some of the big fellows" in the industry. Since the spokesmen for the industry were the "big fellows" referred to, it is understandable that this point would not be stressed.

Although we have been designing and manufacturing pneumatic conveying equipment for the past 30 years, our sales volume remained quite modest until a few years ago when it took a sudden upturn, not only because of the rapidly expanding acceptance of pneumatic conveying but also because many firms already sold on pneumatic conveying . . . were looking for another supplier in the field . . .

We feel there is plenty of room for "littler fellows" who can provide the kind of expert attentive service

VIEWPOINT

Drug Prices—a Positive Approach

MUST DRUGMAKERS TALK TO THEMSELVES in defending the industry against critics of its prices and profits? A few weeks ago *(Viewpoint, Oct. 10, p. 9)*, we suggested that the current approach—to say that drug prices have increased less than the cost of living—was not the one to use.

This week, we point out a positive approach that one drugmaker used in its employee publication. Involved: an editorial written by Samuel Mines, editor of *Cyanamid News*. The item appeared in an issue that highlighted the development of a more effective variant on Aureomycin. We quote from the editorial:

"There are certain hard facts of life about the 'miracle' drugs. They save lives by the millions, but their own lives are often remarkably short.

"Few miracle drugs survive as leaders for more than five years. Pharmaceutical manufacturers can only protect their future by plowing back the profits they make during those years into research to pace their competition.

"Estimates of the percentage of profitable drugs vary, but, conservatively speaking, a pharmaceutical company has less than a 50-50 chance of merely recovering its investment.

"Pharmaceutical profits, therefore, are hard to forecast. No company seems to have a consistent record of high earnings. The best years of the most successful pharmaceutical companies have earned them twice as much income as their worst. Among 12 important pharmaceutical enterprises—including the six leading antibiotic producers—Cyanamid has ranked all the way from second to last in different years on pharmaceutical sales; Pfizer has ranked from first to last; Parke, Davis from first to seventh.

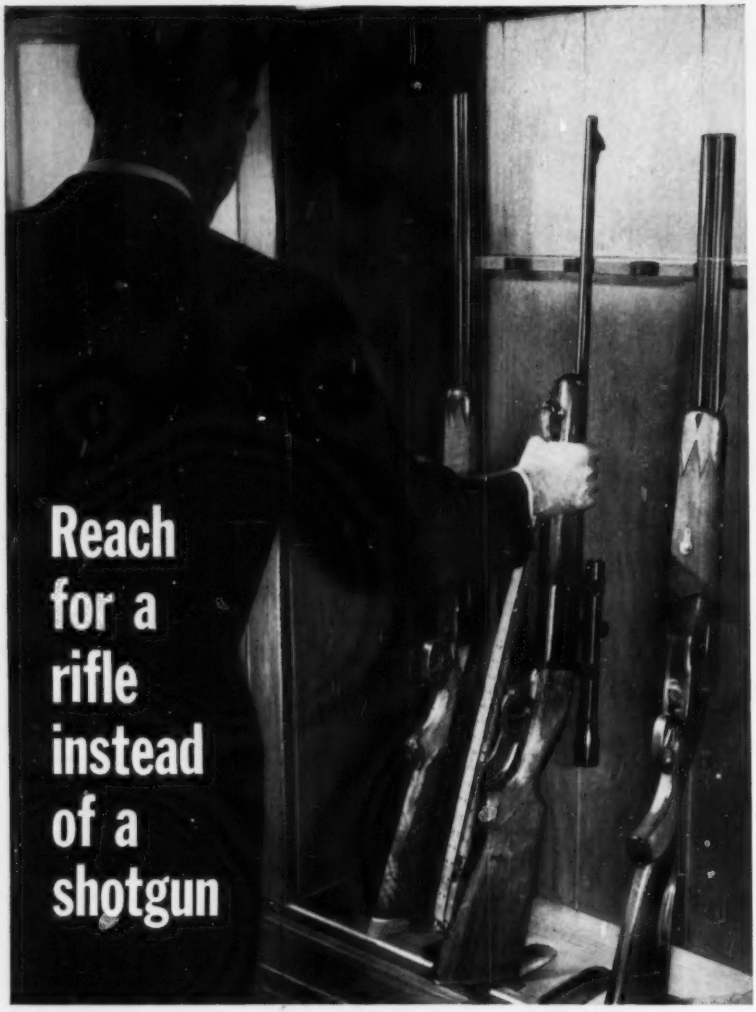
"No leader has remained a leader long.

"Between 1905 and 1935, basic new drugs were added at an average rate of six a year. From 1935 to 1955, the average was 37 a year. New drugs are now being added at the rate of one a day. It is estimated that of these only 8% will have large sales, 7% to 10% will break even and the rest will never repay their investment.

"To the industry, rapid obsolescence is a financial headache and makes the profit picture a very tangled and uncertain one. To the public, the high birth rate of new drugs and the unrelenting pressure of research is assurance that no promising clue to the cure of sickness is likely to be neglected."

This, we feel, is a good approach to the subject. It isn't altruistic. It isn't an oversimplification. It doesn't talk down.

H. C. Johnson
Editor-in-Chief



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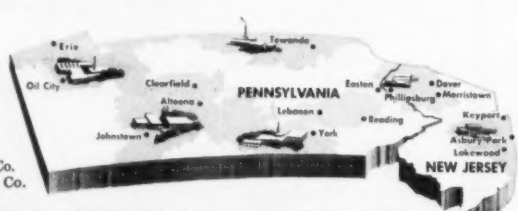

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OPINION

and engineering which the "big fellows" have apparently felt is no longer necessary when you grow to bigness.

LAWRENCE G. CALDWELL
Assistant Manager
Pneumatic Conveying Division
Kennedy Van Saun Manufacturing & Engineering Corp.
New York

Custom Manufacturing

TO THE EDITOR: The chances are that you will probably be subjected to a few letters such as ours from companies in the chemical and drug field that have done considerable custom manufacturing over the past few years.

While we surely realize that not every chemical custom manufacturer could have been interviewed for your article (*CW, Oct. 24, p. 93*), we do think it would have been wise to list as many as possible of the manufacturers, so that your reader public would not be under the illusion that there were but Eli Lilly, Commercial Solvents, Maumee and a few others who did all of the custom chemical manufacturing in this country. . . .

ALLAN W. DEHLS
Benzol Products Co.
Newark, N.J.

CW, *of course, did not intend to imply that the companies mentioned were the sole custom chemical manufacturers.*—Ed.

MEETINGS

Farm Chemicals Marketing Seminar, Barbizon-Plaza Hotel, New York, Nov. 16-17.

American Rocket Society, annual meeting, Sheraton-Park Hotel, Washington, D.C., Nov. 16-20.

Manufacturing Chemists' Assn., 9th semi-annual meeting and midyear conference, Statler Hilton Hotel, New York, Nov. 24.

27th Chemshow Exposition, New York Coliseum, Nov. 30-Dec. 4.

Pulp, Paper and Paperboard Industrial Waste Conference, Edgewater Beach Hotel, Chicago, Dec. 1-2.

American Institute of Mining, Metallurgical and Petroleum Engineers, electric furnace conference, Cleveland Hotel, Cleveland, Dec. 2-4.

American Chemical Society, 15th Southwest regional meeting, Capital House, Baton Rouge, La., Dec. 3-5.

CONTINENTAL *Landmarks*

Periodic progress reports of interest and value to the chemical industry

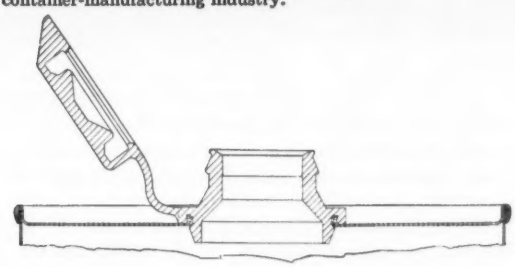
New plastic "Flip Cap" with dripless pour spout outmodes soldered neck nozzles and screw caps

Three-and-a-half years of work at our Metal Division research and development center are behind Continental's new "Flip Cap" closure unit, on which patents are pending.

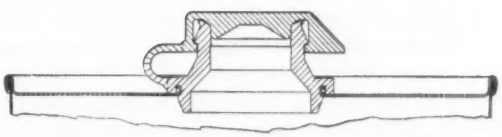
It combines a plastic, dripless nozzle with a captive cap, replacing the soldered screw neck nozzles in use for more than 25 years. Observers have called it one of the most important advances ever made in the pouring-type liquid container.

The "Flip Cap" is inserted into the top of the can *after* filling. This permits higher filling speeds through a larger opening. Elimination of the soldering process prevents solder splashes and flux marks, and permits full lithography on the top of the container. Tests indicate that the "Flip Cap" can be used for practically all liquids now packed in round or oblong nozzle-type cans.

Recognizing the specifications problem that confronts industries interested in benefiting by a new container development, Continental has made its "Flip Cap" captive-cap can available to the entire container-manufacturing industry.



THE CAP is permanently attached by a hinge. Can't be lost or switched. It holds back to permit free pouring, snaps into place easily and is liquid-tight. A variety of colors and shapes can be provided.



APPLIED AFTER filling, caps can be inserted automatically at 200 per minute. With full opening available—not diminished by the presence of a soldered screw nozzle—filling proceeds at a faster pace.

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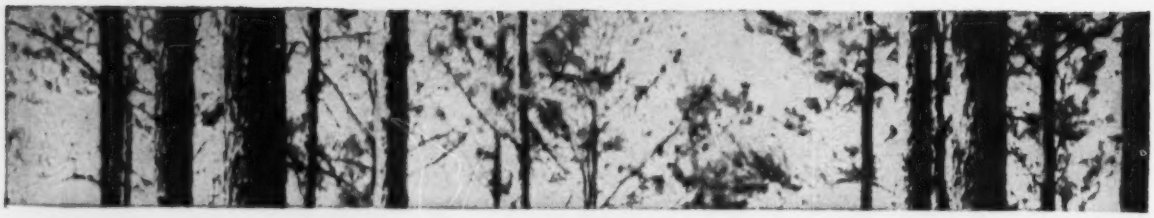

PINE OIL SMELLS CLEAN...CLEANS CLEAN

Today pine oil is one of the most important raw materials used in the manufacture of liquid detergents, soaps, laundry aids, general cleaners, disinfectants, and deodorants. There are two good reasons for this acceptance.

PINE OIL SMELLS CLEAN—It provides the end product with a smell as fresh and reassuring as a pine forest.

PINE OIL CLEANS CLEAN—Pine oil does more than impart odor. It has definite chemical properties as a wetting agent and solvent to actually assist the other components of a cleaning agent in cutting grease. And it has high bactericidal qualities as well.

To keep pace with the expanding demand for pine oil, Hercules and other producers have steadily increased their output and plan still more capacity for 1960.

Pine Chemicals Division
Naval Stores Department

HERCULES POWDER COMPANY
INCORPORATED
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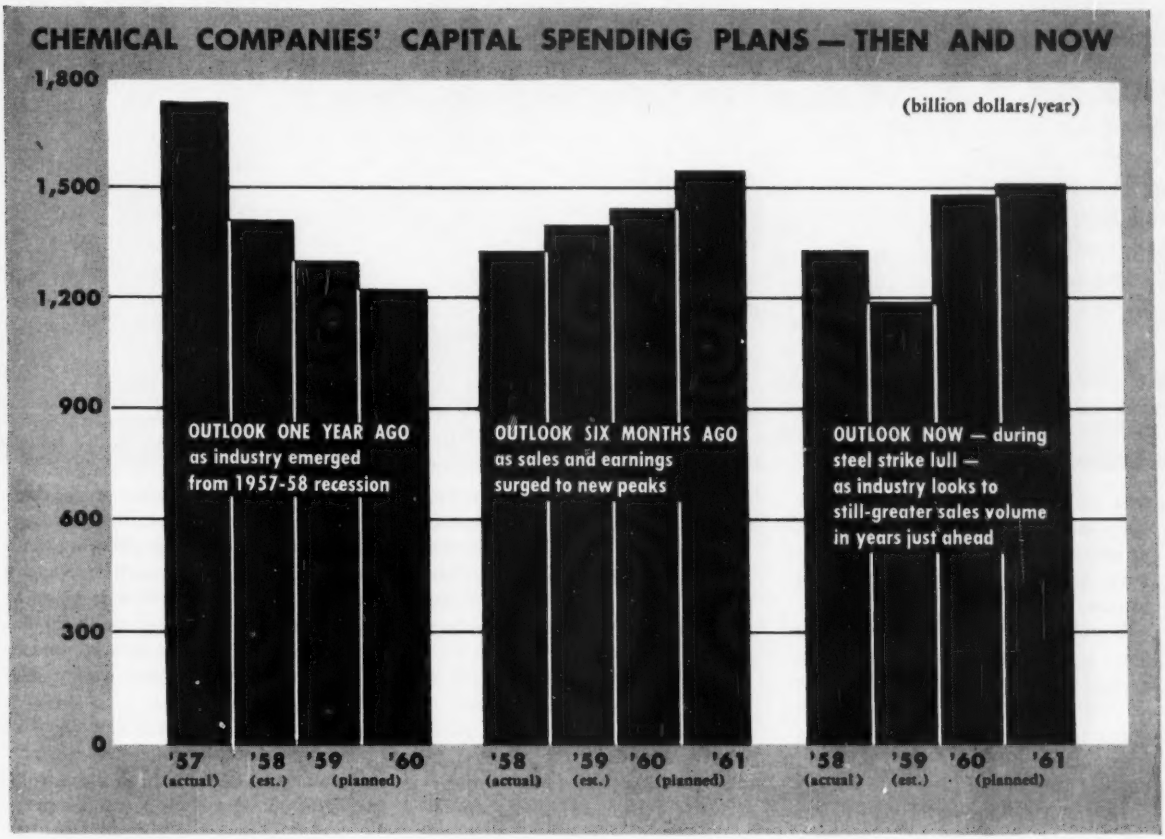

Faster Growth Pace in 1960-61

Chemical process companies have been holding back on capital spending since summer; but their managements are now budgeting a sharp hike in outlays for new plant and equipment next year.

U.S. business as a whole is planning to boost '60 capital expenditures 10% above this year's level, according to McGraw-Hill's fall survey (covering a selected group of companies with more than 50% of the total employment in those industries where capital investment is highest). But in the process industries, current outlook is that capital spending will rise nearly 20% next year (*table, p. 40*).

Makers of chemicals and allied products—after trimming '59 capital spending to $1,188 million—now have programed for '60 a 24% increase to $1,473 million. And they're already thinking in terms of even higher investment levels in '61 (*chart, above*).

Still Faster Growth: Even more intent on rapid growth next year are members of three other process industries—pulp and paper, rubber, and products of stone, clay and glass. They're planning to invest more during '60 than they did in '57, the previous peak for nearly all industries' capital spending.

- Pulp and paper companies this year are investing 6.1% more than last year, and are planning a further 35% step-up next year.
- Makers of stone, clay and glass products have been boosting their capital spending plans from month to month. A year ago, they anticipated outlays of $404 million during '59. By March, they had raised their sights to $498 million; and now they estimate their '59 expenditures at $542 million. For next year, they have in mind an 11.2% increase, to $603 million.
- Rubber companies appear to be on the fastest growth spurt within the CPI at this time. Their capital spending this year is expected to be up nearly 33% from '58, and a 31% boost is projected from '59 to '60. A still higher total—23.5% greater than their '57 peak—is foreseen for '61.

More Cautious Growth: The other process industries are charting more gradual growth rates. In chemicals and allied products, present plans call for 1960-61 capital spending to be well below the '57 pace. During the

CPI CAPITAL SPENDING PLANS: SWITCHING, SHIFTING, GROWING

(million dollars)

	OUTLOOK ONE YEAR AGO				OUTLOOK SIX MONTHS AGO				OUTLOOK NOW			
	'57 actual	'58 est.	'59 planned	'60	'58 actual	'59 est.	'60 planned	'61	'58 actual	'59 est.	'60 planned	'61
All industries	38,437	32,852	33,022	32,661	32,091	34,209	34,263	32,883	32,091	33,914	37,310	34,566
All manufacturing	13,647	10,009	9,678	9,655	9,761	10,472	10,448	10,265	9,761	10,025	11,957	11,171
Process industries:												
Chemicals and allied products	1,724	1,400	1,288	1,211	1,320	1,386	1,441	1,542	1,320	1,188	1,473	1,502
Paper and pulp	811	602	566	634	578	636	617	611	578	613	828	704
Petroleum refining	853	606	588	623	665	698	670	750	665	692	754	814
Rubber	200	136	163	187	134	165	188	203	134	178	233	247
Stone, clay and glass	572	404	447	461	399	498	469	478	399	542	603	594
Nonferrous metals	980	510	398	295	510	428	368	383	510	347	357	350
CPI TOTALS	5,140	3,658	3,450	3,411	3,606	3,811	3,753	3,967	3,606	3,560	4,248	4,211

past six months, chemical companies have increased by $32 million their proposed capital budgets for '60, but have sliced $40 million from the total forecast for '61.

Petroleum refiners are not spending quite so much this year as they were expecting to six months ago, but their '59 outlays will be up 4% from last year's total; and they're projecting a $60-million increase for '60 and another $60-million hike in '61.

Definitely pulling in their horns are the primary producers of nonferrous metals. From their '57 investment peak of $980 million, they dropped 48% to a modest $510 million in '58 and are further subsiding to $347 million this year. Now they foresee only slightly higher capital spending rates in '60 and '61.

Mostly Internal Financing: Although capital spending by all U.S. business is ticketed for an increase of slightly more than 10% next year, the need for external financing will be up only 9.2%. And in manufacturing, the anticipated 19% increase in capital spending will be accompanied by an actual decrease in outside financing.

Over-all, loans and sale of securities to finance capital spending are expected to rise $535 million next year, to a total of $6,354 million. But this is less than 20% of the more than $37.3-billion aggregate of new plant and equipment spending now planned for '60. In manufacturing, mining and petroleum industries, external financing of $868 million will cover only 5.2% of next year's outlays. These industries—which went to the money market for about $3 billion for capital spending in '57—will, of course, be relying primarily on reserves.

Conservative Sales Estimates: While the survey indicates that U.S. business as a whole expects physical sales volume to be up 9% next year, most CPI companies make more conservative estimates for themselves. Makers of chemicals and allied products expect to equal the over-all 9% increase. Members of three other process industries—nonferrous metals, rubber, and stone, clay and glass products—are looking for a 7% sales rise in '60. Pulp and paper companies foresee a 6% sales gain, and petroleum refiners expect only a 3% rise.

The survey—conducted during October by the McGraw-Hill Dept. of Economics—indicates that the long strikes in the steel and copper industries have caused sharp changes in capital spending plans of various industries. In many instances, projects previously scheduled for late '59 and early '60 are probably being deferred; and from this standpoint, the effect of the steel strike is to stretch the capital spending boom over a longer period.

The economists who conducted the survey point out that the companies that participate in these semiannual soundings are usually the larger companies in their respective industries, and that this fact may affect the findings. However, in each successive survey a concerted effort is made to include more medium-size and smaller companies; and more such companies cooperated in this latest survey than in any previous year.

Also, the economists emphasize that the fall survey reflects preliminary planning at the start of most companies' budget season. In times of good business, final budgets for plant and equipment have generally turned out higher than the preliminary estimates; so "there is a good chance that both '60 and '61 will show larger increases over '59 than are now planned."

Ads Under Attack

Last week's climax of Congressional hearings on TV quiz show fixing set off a chain reaction that has already triggered new probes of television advertising practices. The probes have hit proprietary drug and chemical specialty makers particularly—and an over-all result may well be tighter federal controls of ads.

So far, the spotlight has been on the hearings of the House Special Subcommittee on Legislative Oversight, which has produced a parade of admissions that various quiz shows were "rigged." There have been a

number of denunciations of TV producers, networks, sponsors, and modern business in general—and a threat of prosecution for perjury to executives of Revlon, Inc., which sponsored two of the shows in question.

But another stream of headlines will be loosed by the probes that lie ahead:

• Federal Trade Commission Chairman Earl Kintner, spurred by a flood of mail complaints that "too many commercials exaggerate, irritate and nauseate," is intensifying FTC policing of television advertising.

The letters, Kintner says, were prompted by the quiz show hearings.

Even though FTC's jurisdiction may not extend to how the shows were run, it can act against fraud and deception in advertising. Moreover, Kintner has warned that the industry's self-control of taste seems to be breaking down, and he has offered to help the House committee draft legislation.

• The Justice Dept. is also in the act. At President Eisenhower's request, it is investigating whether the quiz show riggers broke any laws, and possibly what legal loopholes need to be closed.

One angle Justice is pursuing: Did rigging the entertainment involve unfair trade practices in advertising? Although no one has hinted that the commercials themselves were rigged, tradenames were prominently displayed throughout the shows.

• The Federal Communications Commission—which has primary jurisdiction over broadcasting—may be prodded into holding hearings.

• Another hearing may be launched by Sen. Mike Monroney (D., Okla.), chairman of the Commerce Committee's subcommittee on communications. Monroney had expected to delve into the quizzes himself after the Brooklyn grand jury hearings last year, but Rep. Oren Harris (D., Ark.), head of the House subcommittee, beat him to it.

Now Monroney may make a broader foray into the broadcasting business. His committee has for some time been studying audience ratings and their effect on sponsors and programing. This may open the broader question of advertiser-sponsor-producer-network relations.

Building Pressure: Even without these new probes, public interest in the whole subject of advertising ethics is being kept alive by editorial comment, speeches and declarations. The American Dental Assn., for example, is urging federal action against "reckless claims" about dentifrices.

When Congress opens in January, a basket of bills will probably be offered, aiming at tighter control of broadcasting. But the proposals that will carry the most weight will be those from Chairman Harris, who is giving no hint of what he'll favor.

2 Blows to Drug Firms

Government lawyers scored tactical victories last week at both big hearings on pharmaceutical pricing.

At the Federal Trade Commission hearing in New York on tetracycline pricing and patents, Hearing Examiner Robert Piper ruled that the drug companies cannot use their own records to counter a government exhibit purporting to show uniformity in pricing. Company lawyers said it would be "impossibly expensive" to subpoena officials and records of more than 300 hospitals to prove that there had been competitive bidding by wholesalers and retailers.

And Selman Waksman, discoverer of streptomycin, appeared as a witness for Pfizer. He testified that Pfizer scientists had "faithfully conducted" fermentation tests to show that tetracycline was not coproduced with chlortetracycline.

But Waksman admitted he had not tested the procedures used. And FTC attorney Daniel Hanscom, still attacking the Pfizer test procedures, got Waksman to imply that Pfizer scientists should have disclosed that in one of its test broths, the antimicrobial potency was five units. American Cyanamid got test broth potencies of 274, according to its patent. FTC considers this a "key point."

At the polio vaccine trial in Trenton, N.J., the government won the right to introduce evidence on prices to overseas buyers. The defendents opposed this, on the ground that showing a disparity in bids to overseas markets while domestic bids were uniform would cause the jury "to infer guilt." But unless the government can prove that domestic and overseas markets are comparable, Judge Phillip Foreman warned, the defense may move to strike the evidence.

Three Offering Stock

Three growing chemical companies have proposed stock offerings with total anticipated company proceeds of about $1.5 million. Purposes: expansion, increased working capital and repayment of outstanding loans.

• The Carwin Co. (North Haven, Conn.) is offering 48,080 shares of $2-par-value common stock. With additional general funds, it will then repay bank loans aggregating $425,000, and finance part of its $1-million expansion program, including a tentatively planned $750,000 isocyanate plant near Houston, Tex.

• Oxford Chemical Co. (Atlanta, Ga.) will offer 227,500 shares of Class A common, par value 25¢/share, to retire a $200,000 loan. It will use the rest for additional working capital, according to a preliminary prospectus.

• Dyna-Therm Chemical Corp. (Culver City, Calif.) is offering 200,000 shares of capital stock at $3/share. Of net proceeds, $180,000 will be used to help pay for purchase of one of its subsidiaries, Plas-Kem Corp., acquired last May; $60,000 will repay a bank loan, and the balance will be used for working capital.

Carwin's Earnings Record: The Carwin Co., which plans to spend about $100,000 in '60 for various plant improvement projects, has just reported record 40-week earnings for the period ended Oct. 11. Its sales, 46% ahead of the like period last year, reached $2,345,064; net profit, 67% higher than the same period last year, amounted to $136,773.

Company products include benzidines, isocyanates, custom organic chemicals and formulated urethane plastic products. The latter is a new venture for the company. A site for the Texas isocyanate plant is under option, but building plans have not yet been disclosed. Aside from the 48,080 shares of stock offered by the company, the underwriters have purchased and will offer to the public 2,000 shares of common stock formerly owned by a principal stockholder, Carwin President Carl E. Van Winckel. The company has one wholly owned subsidiary, Carwin Polymer Products, Inc.

Employees Favored: Oxford Chemical Co. said in its preliminary prospectus that 35,000 of the 227,500 shares will be offered first to company

employees. Any not purchased, plus 72,500 shares, will be purchased by the underwriters; proceeds to the company: $489,125. In addition, the underwriters have agreed to buy 120,000 shares from stockholders; proceeds, $546,000.

The company, organized in '46, manufactures and sells cleaning and sanitation products, insecticides, sealers, deodorants and other chemical specialties. Its two largest product categories: powder cleaners (40% of sales) and floor products (17%).

Dyna-Therm, which makes flame-retardant and heat-resistant coatings, has 1,052,983 shares of stock outstanding. Aside from the 200,000 shares offered, stockholders have agreed to sell the underwriters 10,000 shares of outstanding stock at 30¢/share and 17,000 shares at the same price to persons designated by the underwriters.

Pushing Up the Payout

In their current policies on dividends, chemical companies' boards of directors—as a whole—are keeping in step with their counterparts in other industries. This means that cash dividend payments this year will be up from last year's levels by about 5%—in the chemical industry and in U.S. business over-all.

Although chemical sales and earnings are now being affected more severely than during the first two months of the steel strike, the outlook for most companies is so favorable that they're raising dividend rates (*CW Business Newsletter, Nov. 7*).

Among the latest moves to cut stockholders in on chemical companies' higher earnings, both present and prospective:

- Dow Chemical's directors have declared a 35¢ common stock dividend, payable Jan. 15. This represents a 17% increase over the quarterly dividend that Dow has been paying for the past three years.
- W. R. Grace & Co.'s directors will have a proposed stock dividend to decide on at their first meeting of the coming year.
- Stauffer Chemical's directors have boosted the regular quarterly dividend rate 20%, to 30¢/share, and also declared a 2% stock dividend, both on the company's common stock.
- Directors of Devoe & Raynolds —paint and plastics producing subsidiary of Merritt-Chapman & Scott —have voted a 50¢/share year-end extra dividend on common stock.

Over the first nine months of this year, chemical companies' cash dividend payments were up 4% from last year's nine-month payout, according to the U.S. Dept. of Commerce. Cash dividends paid by the 97 chemical companies listed on the New York Stock Exchange rose 3.6%, to a nine-month total of more than $763 million.

Fracas on Formosa

Hydrocarbon Research, Inc. (New York), this week is preparing its answer to a $10.7-million civil suit over performance of a fertilizer plant on Formosa. Suit was filed in U.S. district court at Trenton, N.J., by Taiwan Fertilizer Co. (Taipei, Taiwan).

The Formosan firm says the plant has produced only about 2,000 metric tons of urea since its completion in March '58, instead of the planned 128,000 metric tons.

The $25-million project was made possible through funds of the U.S. government's International Cooperation Administration. Hydrocarbon Research contracted in '54 to engineer and supervise construction of the ammonia unit. But conversion of ammonia into urea was the responsibility, according to HRI, of Vulcan Copper and Supply Co., under license from Inventa AG., a Swiss firm.

Construction of the ammonia plant was completed 18 months before completion of the urea plant.

Failure of the ammonia plant to produce, according to Edwin Layng, executive vice-president of Hydrocarbon Research, has been due to several factors, including:

- Lack of experienced maintenance and operating personnel.
- Too few U.S. supervisors.

Layng says a similar plant of almost the same size constructed in this country has been in daily operation the past five years. He adds that his company had warned both ICA and the Nationalist Chinese government that the Chinese did not have the necessary trained men to operate such a complex without more funds for training and personnel.

Chaos in Cuba

The seizure of oil company files in Cuba and severe new taxes on mineral exports are only the latest quakes in the eruption of events beginning to disturb U.S. chemical process firms that have some $400 million invested there. Fidel Castro's regime seems to be headed in two directions at an alarming rate—leftward and down.

Behind Castro's tirades against the U.S. is his knowledge that his hold is slipping. Although "the people" are still behind him, he has lost the support of his original backers—business people and landowners—and he's losing the support of the army.

Right now, Castro seems to be racing to communize the countryside before complete chaos sets in. His apparent goals: government ownership of farming, of rural industries, possibly even of mining and petroleum operations.

Short on Cash: If the program doesn't end in revolution, it may end in bankruptcy. The treasury doesn't have the money to carry through the program, and businesses that might generate funds are going into hibernation.

Foreign investment has almost completely stopped. So has tourism, once Cuba's second-biggest industry. Consumer spending for nondurables is up, but private construction is down 68%. Imports—squeezed by restrictions and huge surtaxes—are down, reducing tariff revenues. Sugar sales to Russia and other nations (at below costs) have helped buoy gross reserves to $119.8 million, but they will likely fall to $80 million by year's end.

So far, U.S. drug companies report sales are good—possibly due to hoarding in anticipation of a price increase. A few months ago, the government enforced a 20% price cut. This put some local laboratories in the red, cut deeply into the profits of U.S. exporters. When one U.S. company stopped shipments, the government reportedly accused the local sales manager of being a "counter-revolutionary," and demanded that shipments be resumed. They were.

Many firms are hanging on in hopes of a price rise. But several U.S. firms are reported withdrawing many lines —e.g., vitamins—as they are being replaced by Cuban-made products.

EXPANSION

Alkylate: Great Northern Oil Co.'s Pine Bend refinery has begun construction of Minnesota's first sulfuric acid alkylation plant. Completion target: mid-'60. The more-than-$1-million facility will have an initial capacity of 1,500-2,000 bbls./day; ultimate capacity: 3,800.

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Plastic Containers: Owens-Illinois Glass Co. will open a plant near Toronto, Ont., for production of high-density polyethylene bottles. The plant will be a wholly owned subsidiary and will operate in leased quarters as yet unselected.

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Nylon Chemicals: Du Pont of Canada, Ltd., is spending $400,000 to expand its nylon chemicals facilities at Maitland, Ont. The expansion is aimed at bringing the plant's production to "the level required by the firm's Kingston, Ont., plant," where a $600,000 expansion in textile yarn facilities is under way.

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Paper Chemicals: Pennsalt Chemicals Corp. is approaching a decision on its proposed $10-million plant at Squamish, B.C., to supply chemicals to the West Coast pulp and paper industry. Squamish is on the Pacific Great Eastern railway north of Vancouver. Pennsalt, which has been negotiating with the railroad, would dredge a shipping canal from deep water to a wharf.

COMPANIES

Cary Chemicals, Inc. (East Brunswick, N.J.), has formed Regency Plastics, Inc., to acquire assets of Regency Plastics Co. (Woodside, N.Y.). The firm will be a finishing facility for Cary Chemicals' other subsidiaries, including its Great Bay Plastics & Chemical Co., just coming onstream. Great Bay will produce vinyl sheeting to be printed, embossed and laminated by Regency.

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Great Lakes Carbon Corp. (New York) and Crescent Carbon Corp. (Rosamond, Calif.) have completed arrangements whereby Great Lakes Carbon acquires the plant and physical assets of Crescent. The latter, a subsidiary of Crescent Petroleum, acquires the oil and natural gas holdings of Great Lakes Carbon in Illinois, Kentucky and Kansas and the Garwood fields of Texas. The Crescent plant will become part of Great Lakes Carbon's Electrode Division; Crescent will immediately start drilling on partly developed GLC oil reserves.

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Seaway Chemical Corp. (Chicago) has been organized by Jerome Kritchevsky, until recently vice-president and export manager of Stepan Chemical. Previously, Kritchevsky had been president of Ninol Laboratories until that firm was acquired by Stepan in '57. Seaway will be an export-import agency specializing in chemicals, will also represent Stepan products in foreign markets.

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S. B. Penick & Co. (New York) has acquired controlling interest in Dr. LeGear, Inc. (St. Louis), 67-year-old manufacturer of proprietary animal health products.

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Crown Zellerbach (Canada) Ltd. has acquired Columbia Paper Co., Ltd. (Vancouver, B.C.). Columbia will operate as a division of Crown Zellerbach, giving the company its own distributing outlet in British Columbia.

•

Wyandotte Chemicals Corp. (Wyandotte, Mich.) has established a Corporate Development and Planning Division to be headed by John Reifel. The engineering department of the Engineering and Development Division will be merged into the Michigan Alkali Division.

FOREIGN

Thorium/England: Dow is taking another step to enlarge its European interests through its Swiss holding company, Dow Chemie. With Rio Tinto Co. (London). Dow has purchased Thorium Ltd. from Imperial Chemical Industries and Howards of Ilford. Thorium produces thorium oxide and salts, cerium compounds and rare earths.

•

Chemicals/France: French chemical output in the first nine months of this year rose 7% above the corresponding '58 period. Exports totaled almost $200 million; imports, $186 million. Output gains were scored on sulfuric acid (1,338,000 metric tons produced), primary nitrogen (484,800 tons), chlorine (200,000 tons), acetone (29,500 tons), methanol 30,-400 tons), synthetic phenol (29,700 tons), phthalic anhydride (19,000 tons).

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Pharmaceuticals/West Germany: First-half '59 German drug output rose nearly 4%, was valued at $211.4 million. Exports rose 8.4%, to $55.7 million, including $13.2 million to the Americas and $11.3 million to Asia.

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Fine Chemicals/Mexico: S. B. Penick has set up a sales subsidiary in Mexico to sell its drugs and fine chemicals.

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Pharmaceuticals/Italy: Lepetit (Milan) and Ciba (Basle) have set up a 50-50-owned subsidiary (FERVET) to produce antibiotics and fermentation products at Torre Annunziata, near Naples. Plant construction has started.

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USS TRADEMARK

Washington
Newsletter

CHEMICAL WEEK
November 14, 1959

Headlines about the hunt for a tougher foreign economic policy don't tell the full story as it may affect the chemical process industries.

Official concern over a $4-billion balance-of-payments deficit and slipping U.S. exports centers around efforts to find ways of cutting government expenditures and boosting private sales overseas.

The catch is that any new policies aimed at these goals are not likely to satisfy domestically oriented chemical manufacturers' desires for more protection from import competition, or win international-minded chemical companies' increasingly competitive fight for foreign markets.

A liberal import policy is still an Administration goal. Undersecretary of State C. Douglas Dillon hinted at the Tokyo meetings of the General Agreement on Tariffs and Trade (GATT) that the U.S. might be forced toward more import protection if its trading partners don't substantially lift their restrictions on U.S. exports.

Many regard this as a bad solution to the balance-of-payments problem, simply because, in the long run, it would reduce U.S. sales the government is trying to boost.

Any chemical industry efforts at tighter import curbs would not be helped by its own export-import balance, which continues to run five to one in favor of exports. For the first nine months of '59, figures just released by the Commerce Dept. show, chemical imports totaled $260.6 million, compared with an export total of $1.1 billion.

Furthermore, the U.S. is expecting to reduce its own tariffs in GATT negotiations with the new European "Common Market" next year. This, in fact, is a key weapon in Washington's drive to keep the Common Market from going protectionist itself.

The Manufacturing Chemists' Assn. asked last week that these cuts—limited by law to 20%—be made on a specific item-by-item basis in the chemical product categories, rather than by broad groupings.

On the export side, "Buy American" policies won't mean much in boosting chemical sales. Nor is the removal of dollar restrictions already under way by trading partners of the U.S. under GATT expected to have much significance.

Take, for example, recent dollar import liberalizations by three major U.S. trading partners. Great Britain's controls still apply to synthetic rubber, pigments, dyes and pharmaceuticals, although lifted on calcium carbide, and some chemical raw materials. France's import concessions include ceramics and earthenware, roofing tiles and coverings, but controls remain on most chemical shipments. Japan, which has promised to follow suit, has no current dollar restrictions on chemicals, but restricts imports of chemicals in other ways.

Washington Newsletter

(Continued)

Relaxation of dollar restrictions on U.S. goods does not affect tariffs, customs duties, taxes, licensing procedures and other impediments to U.S. trade. One Commerce Dept. expert estimates that even should all existing specific discriminations against U.S. exports be lifted tomorrow, it would boost total U.S. exports by only about $100-150 million. With chemical exports already running at close to $1.5 billion annually, the concessions would not have much impact.

The worldwide chemical industry may be the most competitive of all manufacturing businesses. Many fast-developing foreign nations —Japan, for one—are struggling to build up their own chemical industries and would not likely pick chemical products as the target for their greatest trade barrier reductions.

The final answer lies with private initiative. This is an argument that is gaining favor among Administration trade experts who apply it to the over-all need for U.S. industry to be more competitive in foreign markets.

What these experts say is needed is better credit and delivery terms, more carefully designed products for specific foreign needs and tastes, and, above all, a more vigorous sales campaign abroad. In fact, argue some officials, the lifting of foreign trade barriers merely paves the way for increased U.S. sales, and tieing aid loans to U.S. products may tend to water down the private sales initiative needed to make trade liberalizations pay off.

•

A proposed list of about 70 more "safe" food additives exempt from the new additives law will be published soon. It is ready now, but the Food & Drug Administration is holding it up until it publishes the final first list of 188 additives. That will be within the next few weeks. Officials figure it would be confusing to put out a new proposed list before the first one is firm.

•

New ground rules on allowable costs in defense contracts have been issued by the Pentagon.

In research and development, the government will be more liberal in cost sharing. More often, however, the rules represent a tightening up of controls. Interest payment, for example, won't be an allowable item under any type of contract, although it is now allowed in some.

While aimed primarily at cost-reimbursement types of contracts, the new rules—effective July 1, '60—will serve as a guide for Pentagon contract administrators on both negotiated and fixed-price contracts. Copies of "Revision No. 50, Armed Services Procurement Regulations" are available (35¢) from the Government Printing Office, Washington 25, D. C.

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n-butyric anhydride
- Acylating agent
- Intermediate

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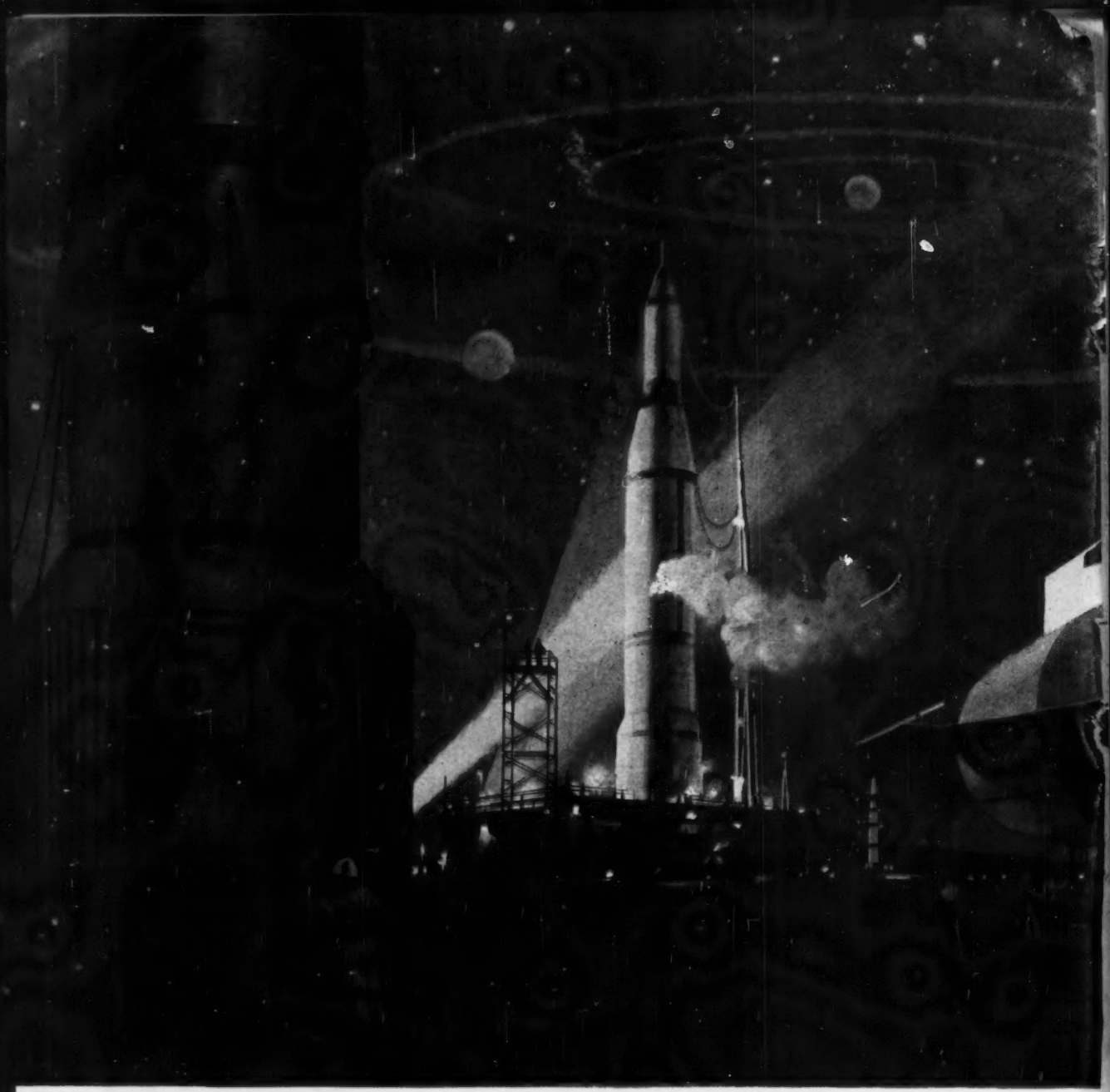

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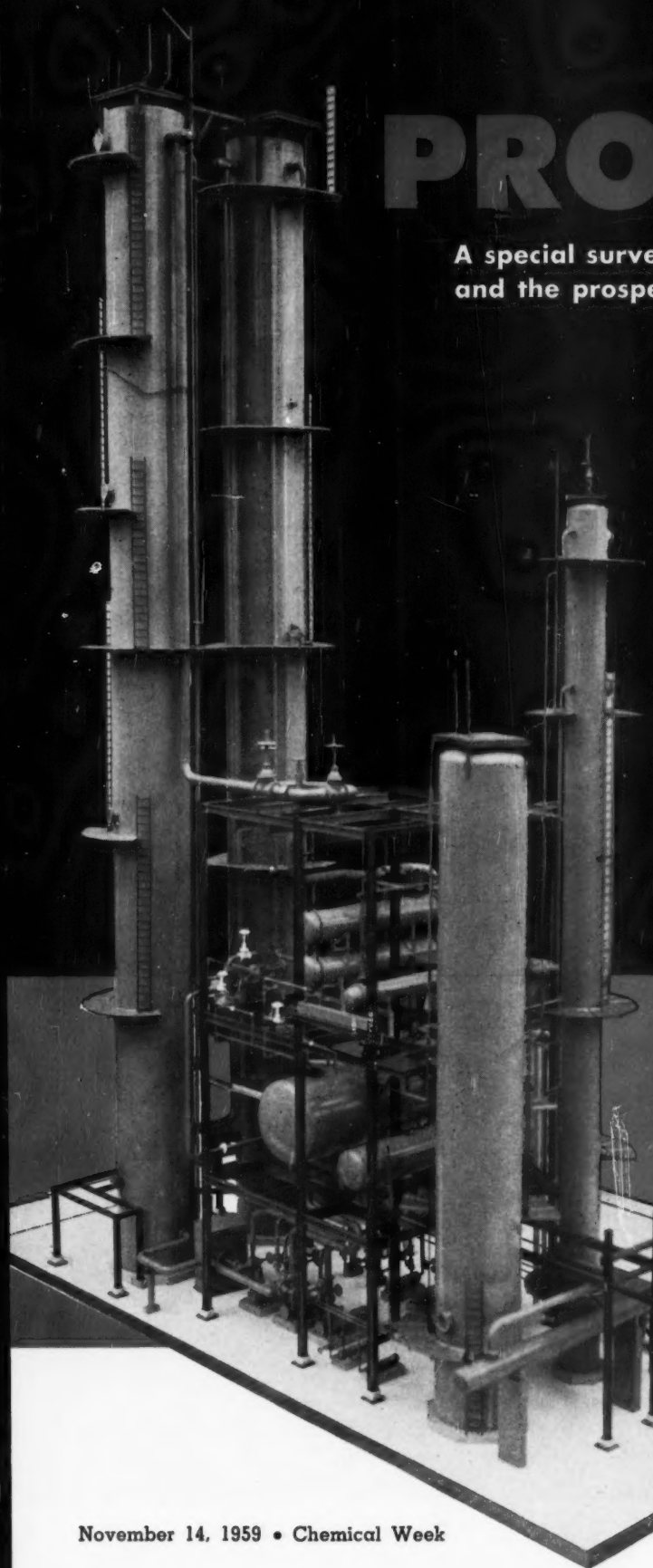
Chemical Week Report

PROPYLENE

A special survey of propylene markets—the present and the prospects for the olefin and its derivatives



Propylene, say knowledgeable petrochemical marketers, is well on its way toward chemical prominence as a major olefinic raw material. And, seemingly, each month brings further word of its stride toward the bigtime.

Note these '59 developments on propylene and some of its principal derivatives:

• In August, Texas Butadiene & Chemical came onstream with a new propylene recovery unit at Channelview, Tex. The 80% propylene concentrate is said to be the first recovered from the effluent of a Houdry butane dehydrogenation unit.

• In July, Sun Oil started construction of a $2-million, 120-million-lbs./year propylene plant at its Marcus Hook, Pa. refinery.

• In March, Mobil Oil indicated that the giant ethylene venture it plans at Beaumont, Tex., would also be able to turn out about 100 million lbs./year of propylene; the plant will start producing in early '61.

• In October, Du Pont made the predicted move *(CW Ethylene Report, April 25)* toward production of acrylonitrile, based on nitric acid oxidation of propylene. It will build a plant at Beaumont, Tex., for early '61 operation. (Petroleum Chemicals has contracted to supply Du Pont with the propylene.)

• Earlier this year, Sohio startled the industry with word that it would be commercially producing acrylonitrile via an ammonia-propylene route in early '60.

• In September, Olin Mathieson revealed a $30-million expansion program, largely propylene-based,

that includes new facilities at Brandenburg, Ky., for glycerine, epichlorohydrin, propylene oxide-glycol, and polypropylene glycol.

Dow Chemical has just installed facilities for making propylene oxide and oxide derivatives at Plaquemine, La. This unit, along with those at Midland, Mich., and Freeport, Tex., gives the firm three producing points for the oxide.

Other projects under way involving the olefin include Shell Chemical's much-touted new method of glycerine synthesis (via hydrogen peroxide, acrolein and allyl alcohol), and Gulf Oil's "multimillion-dollar" oxo chemicals plant now being built at its Philadelphia refinery.

In addition, the U.S. polypropylene plastic and fiber bandwagon continues to scoot along. New plants or expansions are slated by pioneer U.S. polypropylene producer Hercules Powder, and, among others, AviSun, Dow, Humble Oil, Texas Eastman, Firestone Tire & Rubber and Novamont—a U.S. subsidiary of Montecatini (*CW, Sept. 12, p. 39*).

But No Challenge: Despite this rampant growth, it's unlikely that propylene can soon overtake ethylene for top spot among basic petrochemicals. Use of ethylene for chemical manufacture is expected to reach about 5 billion lbs. next year vs. propylene's 2.2-billion-plus.

But the propylene and propylene-derivatives expansions known in the trade, plus a raft of possibilities, may well push propylene use for chemical manufacture to an impressive 3.1 billion lbs. by '65—1 billion lbs. or more higher than today's estimated 1.9 billion, and more than 1.5 billion lbs. higher than such utilization as recently as five years ago.

Much of this increase will come from steady growth of propylene derivatives, such as isopropyl alcohol, acetone and propylene oxide-glycol. But newer outlets, especially those requiring higher-grade propylene, will lend a hefty assist. Among the latter: allyl chloride, acrolein, oxo alcohols and aldehydes, acrylonitrile, and, of course, polypropylene.

Much work is also being done on elastomeric copolymers of propylene, which, if hopes pan out, may one day comprise an important outlet for the olefin. Amorphous copolymers of ethylene and propylene, for example, have, in tests, shown good resistance to aging, and are said to have greater tensile strength in the vulcanized state than do natural rubber or S-BR polymers. One foreseeable use: in passenger tires.

Propylene may also wind up in another rubber, polyisoprene, since isoprene monomer is sometimes based on propylene. A number of refiners intimately associated with the rubber industry are assiduously investigating the propylene-using route, and at least one major rubber and chemical company, Goodyear, is said to be actively seeking a large-scale supplier of propylene for a polyisoprene project.

To accurately appraise propylene's outlook as a significantly important chemical raw material, the growing range of petrochemical operations and products for which it serves as a feed stock must first be evaluated.

There are today six reaction routes that help give propylene its stature as a major raw material. These processes and their principal end-products:

(1) Polymerization — propylene trimer, tetramer, polypropylene plastic and fiber.

(2) Alkylation—heptenes and cumene.

(3) Oxidation—propylene oxide and acrolein.

(4) Chlorination—propylene chlorhydrin, propylene dichloride and allyl chloride.

(5) Oxonation—n-butyraldehyde and isobutyraldehyde.

(6) Hydration—isopropanol.

Construction of the acrylonitrile plants will add a seventh propylene reaction process—ammination.

ISOPROPANOL

From a propylene utilization angle, production of isopropanol (IPA) has been most important for decades. Such manufacture, followed by dehydrogenation of the alcohol to acetone, today consumes more than half the propylene that goes into U.S. chemical production (*see table, p. 67*). Last year, a little under 1 billion lbs. of propylene was hydrated to IPA—a quantity nearly equal to total U.S. production of chemical propylene itself as recently as '50.

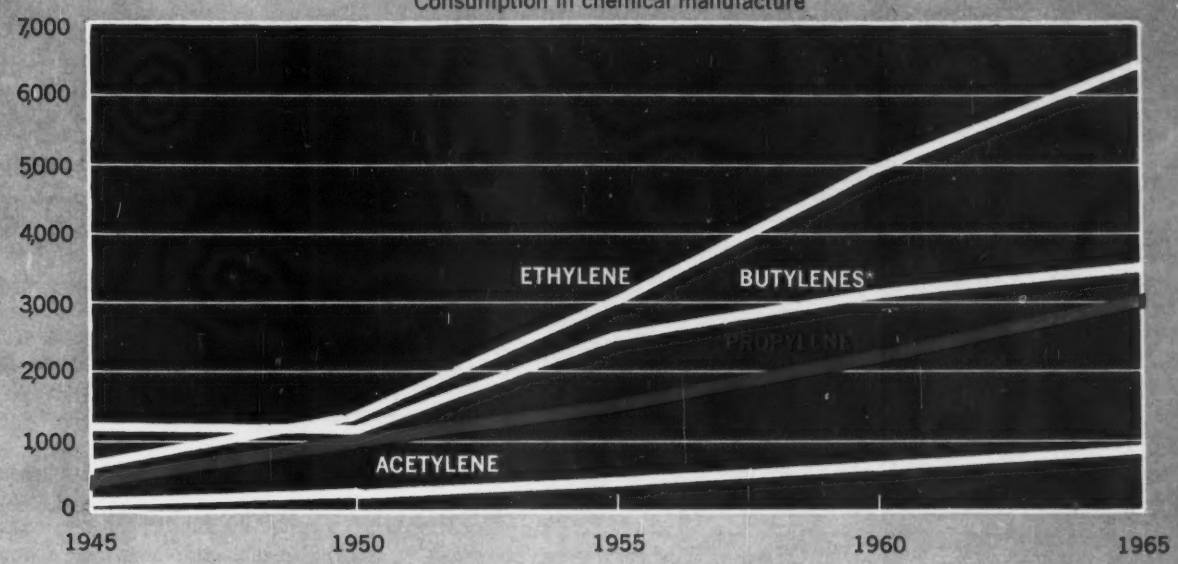
Isopropanol output in the U.S. has generally surged upward over the years, despite occasional ebbs. Production climbed to approximately 920 million lbs. in '51, hovered between 845-855 million annually during the next four years, then moved up to nearly 1.1 billion lbs. in '56. In '57, about 1,191 million lbs. were turned out in the U.S., but output slipped again last year to about 1,029 million lbs.

Chances are, as a result of the general business recovery, IPA production in the U.S. will just about reach the '57 level this year. Allowing for modest growth of most isopropanol uses, total turnout next year should hit 1.2 billion lbs., then climb steadily to nearly 1.4 billion by '65 (*see table, p. 67*).

Although there are a number of IPA resellers, three major companies (Shell, Esso Standard and Union Carbide) have for years each accounted for roughly

Propylene: one of the basics

Consumption in chemical manufacture



* Includes butylene equivalent of butadiene manufactured from butane.

1959 U. S. isopropanol producers, locations, capacities

	(est. million pounds)
Esso Standard Oil (Baton Rouge, La.)	400
Shell Chemical (Dominguez, Calif.; Houston, Tex.; Martinez, Calif.; Norco, La.)	500
Union Carbide (Institute, W. Va.; South Charleston, W. Va.; Texas City, Tex.; Whiting, Ind.)	400
	1,300

1960 U. S. consumption of isopropanol (100%)

	(est. million pounds)
Acetone manufacture	665
Solvent (oils, gums, shellac, synthetic resins, etc.)	180
Chemical manufacture other than acetone	170
Rubbing alcohol, drugs	100
Antistalling gasoline, de-icing	5
Misc. (including exports)	55
	1,175

one-third of IPA production totals. No exact capacity figures are available, but as a result of recent expansions, Shell's IPA potential probably exceeds both Carbide's and Esso's by about 100 million lbs./year (*see table, p. 55*). Through Enjay, Esso markets the greater portion of the alcohol it makes, while the other two majors consume the bulk of their output as a raw material for acetone.

IPA sales—and use—this year are running well ahead of the '58 recession levels. Few marketers, though, anticipate any startling pickup over the long-term future. The material, probably the oldest petrochemical of note, has long since reached maturity, and all but the most optimistic concede that no bright new use for IPA is on the horizon.

One significant use for isopropyl alcohol—second only to manufacture of acetone—is as a solvent for oils, gums, shellac and, especially, synthetic resins. Such use may amount to about 180 million lbs. next year, about 60 million lbs. higher than the quantity consumed in '56.

One for the Other: The similarity between IPA and ethyl alcohol often fosters substitution of one for the other, particularly on the basis of a more favorable price. Over the past few years, though, both solvents have maintained fairly level price patterns. The only change since '56 was a simultaneous 5¢/gal. hike last fall (because of increasing manufacturing costs) that pegged ethanol (190-proof, tanks, delivered), at 52¢/-gal., and IPA (99%) at 46¢.

Thus, it would seem that IPA, which at one point in '51 was selling for 43¢/gal. less than fermentation ethanol (47¢/gal. vs. 90¢), has today reached its maximum replacement of ethyl alcohol; its growth as a solvent will now be tied to broadening of current uses.

Utilization in chemical manufacture other than for acetone (e.g., in the synthesis of isopropyl acetate, xanthates, and other derivatives) will likely increase to about 170 million lbs. next year, and to about 200 million in the next couple of years, compared with the approximate 115 million lbs. consumed in '56. A similarly moderate climb is expected in use for rubbing alcohol and drugs. Total estimated consumption of IPA for the latter category next year: 100 million lbs., compared with about 60 million in '56.

One outlet that has suffered a dramatic decline, however, is as a gasoline additive and de-icer. Three or four years ago, IPA was heading for the 100-million-lbs./year mark as a preventive of carburetor freeze-ups—promoted principally by Esso, as a component in its much-publicized "antistalling" gasoline.

Since then, Esso and other major oil companies have researched and found more effective and less expensive compounds than IPA mixtures. These include surface-active agents—for example, alkylamine phosphates.

Result of the switching was an abrupt downtrend in use of isopropanol as an additive. Today, the gasoline and de-icing outlet takes less than 5 million lbs./year of total IPA consumed—and this is probably a generous estimate.

ACETONE

But these alterations in the isopropanol end-use pattern are—and will continue to be—minor, compared with the distortion caused by acetone market fluctuations.

Last year, for example, nearly 85% of all acetone produced in the U.S. was derived from dehydrogenation of IPA. Or, to measure the interdependence in the other direction, acetone manufacture will take about 57% of the 1,175 million lbs. of isopropanol expected to be consumed next year (*see table, p. 55*).

There will be in place in the U.S. in '60 about 767 million lbs. of isopropanol-derived acetone capacity, about 94 million lbs. of acetone-from-cumene capacity, 35 million lbs. from liquefied petroleum gas (LPG) oxidation, and, although currently operating at less than 25%, about 45 million lbs./year of fermentation-acetone capacity (*see table, p. 57*).

Acetone output over the years has consistently lagged well behind total capacity. As far back as '51, for example, production totaled about 560 million lbs., while estimated capacity was 65 million lbs. higher.

Consumption in '57 scarcely hit 650 million lbs., while capacity in place early the following year was close to 800 million lbs. (*CW, April 13, '57, p. 90*).

There's little reason to believe that over-all acetone requirements will soon climb anywhere near the estimated 941-million-lbs./year capacity expected to be in place in '60, since there appears to be no new acetone development that could significantly step up use.

And a lower acetone price can also be eliminated as a major demand incentive. Official price tags have fluctuated between a high of 8½¢ and a low of 7¢/lb. over the past five years—they're now back to 8½¢/lb., tanks, delivered—and even the higher price tag has long been considered by producers as being in the bargain-basement range.

That's one factor in the belief that any future expansion of capacity will not come via the direct IPA route in which acetone alone is produced, but in processes that will turn out a number of end-products, including acetone.

Cumene Up: Since '53, acetone from cumene has given some competition to the IPA-acetone and the LPG oxidation routes. Propylene and benzene are the starting materials in this process in which, as the first step, cumene is formed. The cumene is then air-oxi-

dized to cumene hydroperoxide, which is split, yielding about 0.6 lbs. of acetone to each pound of phenol.

Cumene-phenol facilities have mushroomed recently (*CW, Feb. 21, p. 91*) and will grow further when Shell Chemical's first phenol plant, now under construction at Houston, Tex., goes into operation next month. Probable capacity—about 40 million lbs./year.

Nonpropylene-connected expansion affects the overall phenol picture:

Reichhold Chemicals is putting up a new phenol plant at Tacoma, Wash., that uses the classic sulfonation route. It will have an initial production rate of 30 million lbs./year, but is designed for an output increase to 60 million. Reichhold is also boosting capacity at Tuscaloosa, Ala., to 72 million lbs./year.

These increases, plus Shell's new operation, will boost total U.S. phenol capacity (synthetic and natural) to nearly 890 million lbs./year by the end of '60.

Benzene sulfonation, the route used by Reichhold, won't affect acetone availability, of course, but Shell's expansion will add approximately 31 million lbs. to the total U.S. acetone capacity.

(Last year, U.S. cumene hydroperoxide plants produced about 56 million lbs. of acetone—roughly 9% of the total 611 million lbs. produced in '58.)

Shell will also turn out additional acetone via two other propylene-based processes that yield the ketone as a coproduct—oxidation of isopropanol to produce hydrogen peroxide at its 30-million-lbs./year plant (Norco, La.), and the soon-ready isopropanol-acrolein process, which makes allyl alcohol. The latter is an intermediate for Shell's new, much discussed but not yet producing, synthetic glycerine process.

When current projects are complete, Shell's acetone capacity at Norco will be about 82 million lbs./year.

Another acetone process in use in the U.S. is Celanese's oxidation of propane and butane. Capacity at its Bishop, Tex., location is about 35 million lbs./year, and output this year will be close to capacity.

Mild Pickup: According to government figures, production of acetone from all sources last year, which totaled 611 million lbs., was a decided drop from the previous year's 651 million. It's likely that the loss will be more than made up this year.

Few market followers will disagree with the prediction that acetone use will continue to grow, albeit modestly, in the near future. Although some direct solvent applications of acetone have eased off (e.g., use as a cellulose acetate solvent), jobs for nonsolvent chemical derivatives, particularly methyl methacrylate, are picking up.

Methyl isobutyl ketone (MIBK) and methyl isobutyl carbinol (MIBC), together, have traditionally accounted for the largest share of U.S. acetone production and

1960 U.S. acetone end-use pattern

	(est. million pounds)
Derivative solvents:	
Methyl isobutyl ketone (MIBK)	155
Methyl isobutyl carbinol (MIBC)	75
Others (mesityl oxide, diacetone, hexylene glycol, phorone, isophorone, etc.)	85
Methyl methacrylate	100
Drugs, vitamins, miscellaneous chemicals (bisphenol-A, acetyl acetone, etc.)	85
Solvent uses:	
Paint, varnish, lacquer	70
Cellulose acetate	40
Acetylene	30
Misc. solvent, stock changes	70
Exports	8
	718

1960 U.S. acetone capacity

		(est. million pounds)
Isopropanol:		
Shell Chemical	Dominguez, Calif.	150
	Houston, Tex.	180
	Norco, La.	82
Union Carbide	Texas City, Tex.	150
	Whiting, Ind.	120
Tennessee Eastman	Kingsport, Tenn.	60
Esso Standard	Linden, N.J.	25*
		767
Cumene:		
Allied Chemical	Frankford, Pa.	27
Hercules Powder	Gibbstown, N.J.	15
Shell Chemical	Houston, Tex.	31
Standard Oil (Calif.)	Richmond, Calif.	21
		94
LP-G oxidation:		
Celanese	Bishop, Tex.	35
Fermentation:		
Publicker Industries	Philadelphia	45
	Grand total	941

*Esso is now in small-scale acetone production at its Bayway refinery, utilizing a portion of its estimated 100-million-lbs./year methyl ethyl ketone capacity facilities. Officials won't comment on acetone capacity, but trade followers peg the listed 25-million-lbs./year figure as "credible."

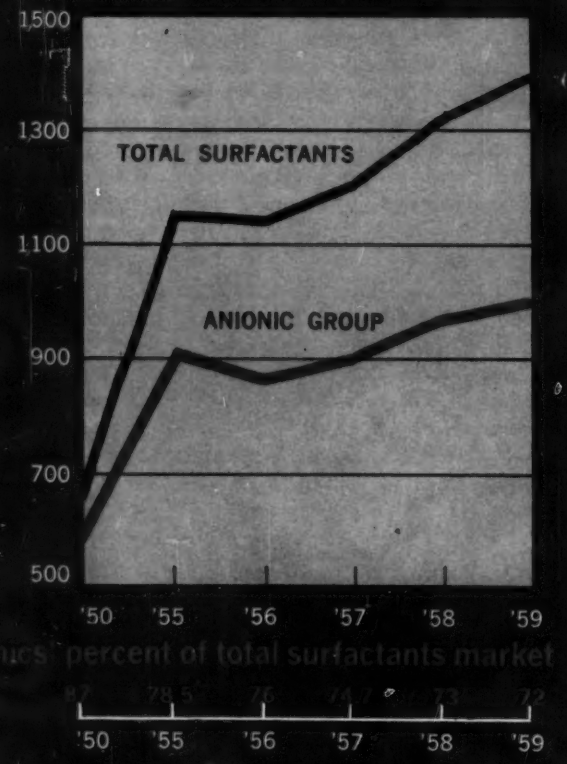
U.S. oxo chemicals capacity a whopping excess?

		Estimated '59 Capacity	Possible Expansions (million pounds)	
Amoco Chemicals	Wood River, Ill.	15	50	(uncertain)
Esso Standard	Baton Rouge, La.	60	60	(under consideration)
Gulf Oil	Port Arthur, Tex.	12	—	
	Philadelphia	—	36	(due mid-'60)
Texas Eastman	Longview, Tex.	125	—	
Union Carbide	Texas City, Tex.	60	60	(due early '60)
		272	206	

U.S. surface-active agents output*

Anionics share: smaller percent of a larger total

(est. million pounds)



* Projected on basis of industry and U.S. Tariff Commission figures in terms of 100% active material, excluding all organic salts formed as by-product, water and diluents.

will continue to follow the same pattern, at least during the next few years. For instance, MIBK-MIBC acetone requirements in '57 tallied around 200 million lbs.; next year's estimate is 230 million, with MIBK accounting for two-thirds of the take (*see table, p. 57*).

Use of acetone as a cellulose acetate solvent will total no more than 40 million lbs. next year, a sharp drop from the 150 million lbs./year consumed in the early '50s. The slide has paralleled the decline in output of acetate, which has given way to other plastics (vinyls, polystyrene) in toys and other outlets.

The brightest acetone growth area at present appears to be use in the production of, and as a solvent for, methyl methacrylate. By '60, consumption for methacrylates will exceed the 100-million-lbs./year mark.

Biggest methacrylate push in the last few years has come from the noteworthy acceptance of acrylics in the coating materials field, and especially in auto finishes. (General Motors, for instance, has switched completely to acrylic finishes.)

In addition, other methacrylate-based products (extruded flat sheet for the sign and lighting industries, ink resins, reinforced plastics laminations, hot-melt and heat-seal adhesives) show heartening promise.

This promise is behind Du Pont's just-revealed plan for a 40% expansion in methyl methacrylate monomer capacity at its Belle, W. Va., plant. Du Pont's boost will probably increase the firm's monomer production capability to about 70 million lbs./year by mid-'60. Only other producer is Rohm & Haas, now that Hercules Powder and Imperial Chemical Industries have dropped plans for a joint methacrylate venture.

R&H capacity, after some unannounced expansions, probably exceeds 100 million lbs./year.

There has been trade speculation that others are interested in methacrylate production, but Escambia Chemical will likely be producer No. 3; it will begin turning out semicommercial quantities (about 100,000 lbs./year) sometime in '60. (Escambia's operation, though, will not affect propylene and acetone, since its process is said to be based on isobutylenes.)

All told, despite the lessened growth of some outlets, acetone consumption in the U.S. will increase to nearly 720 million lbs. next year, and will show no tendency to backslide over the next half decade.

PROPYLENE TRIMER, TETRAMER

The second-largest consumer of chemical propylene, next to isopropanol, is its conversion by petroleum refiners into so-called low-molecular-weight polymers. Of the two most important, propylene trimer (nonene) and tetramer (dodecene), the tetramer consumes well over 80% of the nearly 600 million lbs./year of propylene so converted. The big bite can be attributed to the

stature of dodecylbenzene sulfonates in the detergents market. These anionics are the largest outlet for the dodecene. (Currently, dodecylbenzene production is about 500 million lbs./year.) Another sizable tetramer consumer: oxo conversion into tridecyl alcohol, also used for surface-active agents.

Anionic detergents' share of the total U.S. surfactant market, in percentage figures, has been steadily dropping; but in pounds, the group's share is well on the way to a doubling of the '50 quantity of 591 million lbs.; this year, anionics will be slightly more than 1 billion lbs. of the 1.4 billion lbs. of surfactants produced.

On the other hand, propylene trimer production is tied mostly to oxo derivatives used in the manufacture of plasticizers. A big share also filters to nonyl phenol nonionic surfactants (*CW Ethylene Report, April 25*).

Together, tetramer and trimer, plus smaller requirements for pentamer and other polymers, last year accounted for approximately 560 million lbs. of the 2 billion-plus lbs. of propylene used in chemicals.

Latest to step into the propylene tetramer production arena is Monsanto's Lion Oil Division. Part of the current multimillion-dollar expansion program at its El Dorado, Ark., refinery is an estimated 40-million-lbs./year tetramer plant that was slated to start operating late in October.

OXO CHEMICALS

The oxo process (essentially a liquid-phase reaction of an olefin with synthesis gas in the presence of a cobalt catalyst) is one area of rapidly growing propylene interest. Why? Propylene, propylene tetramer and propylene trimer are three major commercially used feed stocks for oxo alcohols and aldehydes.

Principal products derived from propylene proper are n-butyraldehyde and its by-product isobutyraldehyde. These are turned out chiefly by Texas Eastman in a whopping 125-million-lbs./year plant at Longview, Tex.

Union Carbide, Esso and Gulf use trimer and tetramer for decyl and tridecyl alcohols; Amoco reportedly makes only decyl.

Problem for today's oxo chemicals market is simply excess capacity. And the situation will worsen if all contemplated expansions (206 million lbs.) materialize.

Union Carbide and Gulf Oil will be in with new units next year (*see table, p. 58*), and Esso management is "considering" an expansion move. Big question mark in the industry hangs over Amoco's plans. Last year the company indicated it would build a 50-million-lbs./year oxo plant to supplement output from its present 15-million-lbs./year Wood River, Ill., installation.

When trade talk circulated that Amoco was shelving the expansion plan, the company reportedly denied any pullback. Although Amoco may go ahead with the expansion plan, a company spokesman, in response to a direct *CW* query, asserted: "We are not prepared to comment on our position."

Bulk of the oxo alcohols and aldehydes produced is used in manufacture of various plasticizers (especially for vinyls), and detergents; smaller amounts are used as solvents and intermediates. One threat to many of these outlets is Continental Oil's upcoming straight-chain primary alcohols plant, due in at Lake Charles, La., sometime in early '61 (*CW Ethylene Report, May 9*). Conoco's 50-100-million-lbs./year installation will employ a new process to convert ethylene into a series of alcohols for use in such products as detergents, plasticizers, lube oil additives.

PROPYLENE OXIDE-GLYCOL

The decline in some outlets, combined with growth in others, causes a rather moderate upslope in the propylene oxide-glycol consumption curve. For example, antifreeze use of propylene glycol (for which

1960 U.S. propylene oxide-glycol capacity

		(est. million pounds)
Celanese	Bishop, Tex.	8
Dow Chemical	Freeport, Tex.	100
	Midland, Mich.	15
	Plaquemine, La.	30
Jefferson	Port Neches, Tex.	40
Olin Mathieson	Brandenburg, Ky.	40 (due early '60)
Union Carbide	South Charleston, W. Va.	80
Wyandotte	Wyandotte, Mich.	22
		335

Propylene oxide: today's applications

Outlet	*(million pounds)*
Propylene glycol (for hydraulic fluids, polyesters, humectant use, etc.)	100
Polyethers (urethanes)	20
Polypropylene glycols	15
Misc. (isopropanolamines etc.)	10
	145

the oxide is an intermediate), has collapsed since the early '50s, when production of ethylene glycol started in volume.

In contrast, growth of polyester resins, hydraulic fluids, fatty acid esters and USP-grade markets (e.g., in cosmetics and as tobacco humectants) has nudged propylene glycol production to the 100-million-lbs./-year level.

In addition, propylene oxide itself has been showing strength in such outlets as polyether urethanes and surface-active agents. Today, the urethanes alone take about 20 million lbs./year of propylene glycol (*see table, p. 59*). And propylene oxide polymers may have a big future as synthetic rubbers.

All told, U.S. production of the oxide is approaching a '59 rate of close to 150 million lbs./year, and this is expected to climb to about 160 million lbs. next year. The outlook for '65: about 220 million lbs.

It's difficult to pinpoint propylene oxide-glycol capacity since it is produced via the chlorohydrin route, a method that also turns out ethylene oxide-glycol. Of the five current producers, Dow, with three producing locations, leads the list; a trade estimate (in the absence of any admitted Dow figure) pegs the firm's total at about 150 million lbs./year.

Later this year, Jefferson, at Port Neches, Tex., is slated to allocate about 40 million lbs. of its 110-million-lbs./year ethylene oxide-chlorohydrin capacity to propylene oxide. And early in '60, newcomer Olin Mathieson is expected to be producing a similar quantity of propylene oxide in facilities at Brandenburg, Ky.

The growing trend toward ethylene oxide manufacture via direct-oxidation processes will make increasing amounts of chlorohydrin facilities available for propylene oxide-glycol production. The switch may well provide, by the end of next year, at least 335 million lbs./-year of propylene oxide capacity (*see table, p. 59*).

This towering chlorohydrin-oxide capacity will doubtless supply all requirements for some years to come. There has been much investigation, however, of direct oxidation of propylene as a route to propylene oxide-glycol. Among the probers, reportedly, are Union Carbide, Celanese, Dow, and General Tire & Rubber.

Proponents generally believe that the economics of the direct-oxidation method—which eliminates, for example, the need for chlorine—already compare favorably with the older process. But consensus is that it won't become a major commercial reality until some existing chlorohydrin plants are, in effect, retired, or until demand for propylene oxide-glycol exceeds the capabilities of existing makers.

Significantly, two of the companies heavily interested in the direct propylene oxidation process are at both ends of the current propylene oxide production spectrum—Dow is the largest producer; General Tire is only pilot-planting.

With increasing production, prices have shown a slight drop. In '54, tank-car quantity buyers paid 17½¢/lb., delivered in the East. Today's price is 15½¢/lb.

GLYCERINE

Later this year, U.S. synthetic glycerine capacity is scheduled to be increased by about 35 million lbs./-year (*see table, below*). But more significant than the

U.S. synthetic glycerine: excess now – and more to come

		(est. million pounds capacity)	*Process*
Shell Chemical	Houston, Tex.	110	Propylene-chlorine
	Norco, La.	35 (due late '59)	Acrolein-hydrogen peroxide
Dow Chemical	Freeport, Tex.	72	Propylene-chlorine
Olin Mathieson	Brandenburg, Ky.	35 (due early '61)	Propylene-chlorine
	Total	252	

1960 U.S. glycerine end-use pattern

	(est. million pounds)
Alkyd resins, ester gums	90
Cellophane	55
Tobacco	40
Explosives	25
Cosmetics, dentrifices	16
Other drugs, pharmaceuticals	14
Misc. (food, paper, corks, gaskets, etc.)	20
	260

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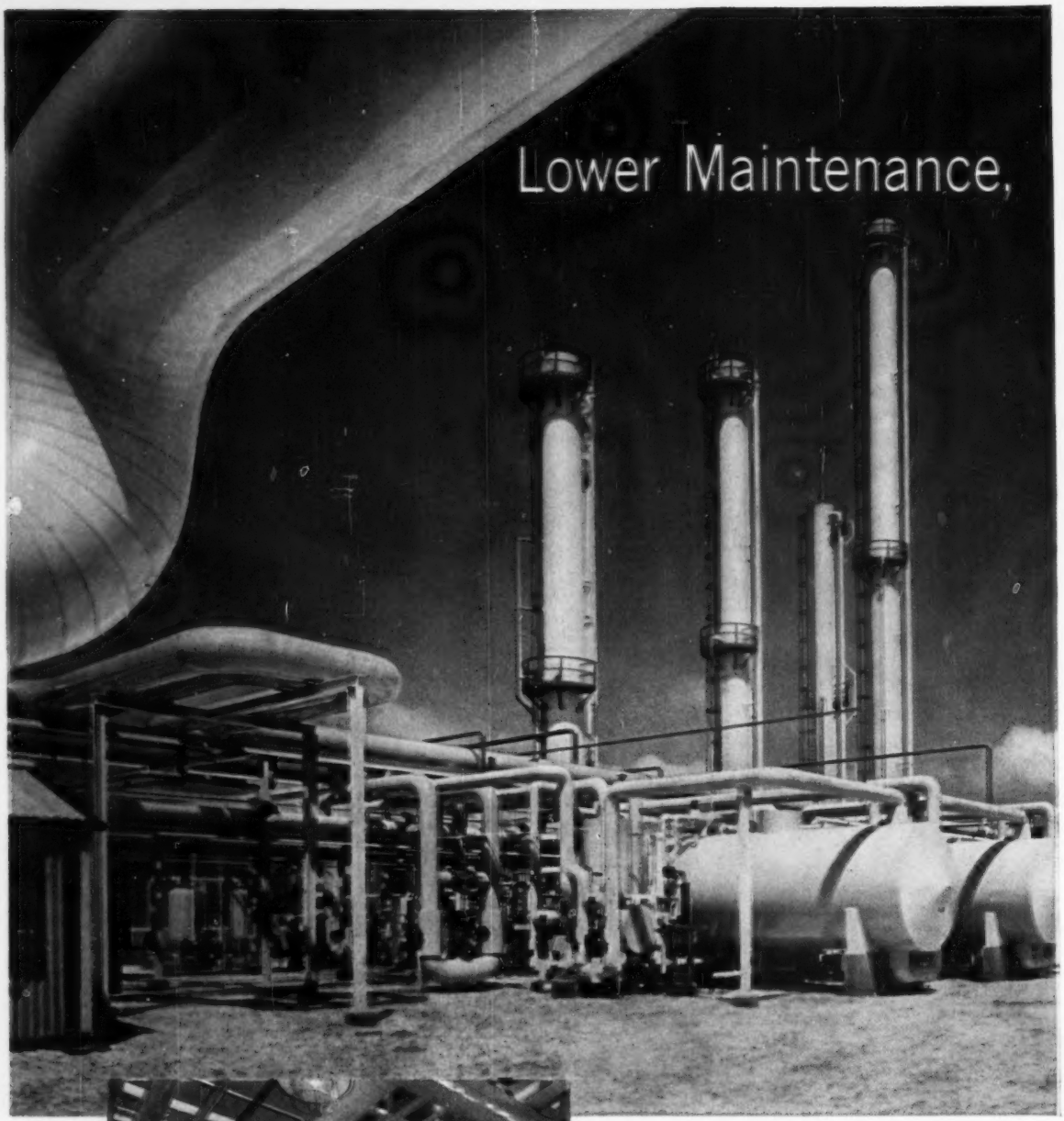

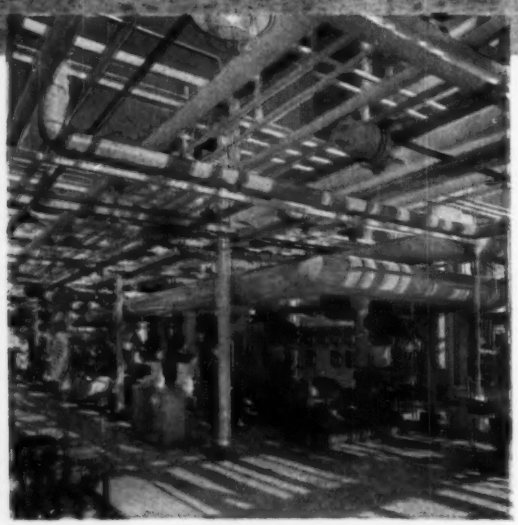

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TRADE-MARK

Superior Oil has installed jacketing made of Reynolds Aluminum on the process vessels and pipe lines at its new Lowry gas processing plant near Lake Arthur, La. But this is aluminum jacketing with the big *plus*. It's made with Reynolds Colorweld—*pre-painted* aluminum for added beauty and lower maintenance.

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increase—especially for propylene consumption—is the spanking-new process Shell will use at Norco, La.

Shell's radical departure from the "classical" propylene-allyl chloride route to glycerine—a process it pioneered in '48—involves acrolein-derived allyl alcohol and hydrogen peroxide as intermediates. The prime saving will be in the elimination of chlorine, which, in the allyl chloride method, is consumed in a two-to-one molar ratio to the glycerine produced.

Shell produces hydrogen peroxide at a 30-million-lbs./year plant at Norco, and construction contracts call for completion of the acrolein unit—as well as the glycerine installation—before the end of '59.

Another important glycerine development, with completion more than a year off, is Olin Mathieson's entry as a producer. OM plans a 30-35-million-lbs./year plant as part of its $30-million, chiefly propylene-based expansion program at Brandenburg, Ky. The new unit is expected to go the traditional propylene-chlorine route, also used at Shell's Houston, Tex., plant (which has an estimated 110-million-lbs./year capacity), and at Dow's expanded 72-million-lbs. glycerine installation at Freeport, Tex.

The traditional glycerine process also yields epichlorohydrin, an epoxy resin raw material, at an intermediate stage. This characteristic reportedly was behind Union Carbide's application for a certificate of necessity a few years ago when it was considering expansion of its epoxy resins operations (*CW, Sept. 15, '56, p. 80*).

Propylene-based glycerine now accounts for almost one-half the total glycerine produced in the U.S. (*CW, Aug. 15, p. 75*). The growth has come less from the expansion of glycerine-consumption than from the diminishing supplies of natural glycerine as soap has lost ground to synthetic detergents.

Until Olin Mathieson comes in with its new glycerine facilities in early '61, Shell and Dow will continue to share glycerine markets that will consume around 260 million lbs. of natural and synthetic material next year. Alkyd resins and ester gums will take the greatest share of the total (90 million lbs.), followed by cellophane's estimated need for about 55 million; tobacco, 40 million. Smaller amounts go into such uses as explosives and cosmetics (*see table, p. 60*).

All told, synthetic glycerine production in '60—close to 135 million lbs.—may need approximately 90 million lbs. of propylene, and that requirement will increase moderately to about 134 million in '65.

ACROLEIN, OTHER INTERMEDIATES

Here are some of the marketing aspects—and prospects—for acrolein, allyl alcohol and hydrogen peroxide, the intermediates related to Shell's new process.

Currently, only Union Carbide commercially pro-

U.S. polypropylene producers: The field will crowd up fast

		est. Capacity (million pounds)	
AviSun	Port Reading, N.J.	20	(planning additional large-scale plant – possibly 100 million lbs./year)
Dow Chemical	Bay City, Mich.	10	(early '60)
	Torrance, Calif.	25-30	(early '61)
Hercules Powder	Parlin, N.J.	20	(increase to 50 million lbs. in '60; considering large plant – possibly 100 million lbs.)
Humble Oil (Esso)	Baytown, Tex.	40	(early '60 can be expanded to 100 million lbs./year)
Novamont (Montecatini)	Neal, W. Va.	25	(early '61)
Texas Eastman	Longview, Texas	*	(estimated 30 million lbs./year – mid-'60)

Other likely producers: Allied Chemical, Amoco Chemicals, Firestone Tire & Rubber (*CW, Sept. 26, p. 22*), Goodrich-Gulf, W. R. Grace, Koppers, Monsanto, National Distillers, Phillips Chemical, Shell Chemical, Union Carbide, Spencer.

*Texas Eastman now producing "limited" commercial quantities; ultimate size of planned full-scale plant still undecided.

High-purity propylene capacity: more potential than actual

		'59 Capacity	*Potential*
		(est. million pounds)	
Esso Standard	Baton Rouge, La.	–	200
Mobil Oil	Beaumont, Tex.	–	100
Petroleum Chemicals	Lake Charles, La.	–	60
Phillips Chemicals	Sweeny, Tex.	–	80
Sinclair Petrochemicals	Marcus Hook, Pa.	40	130
Sun Oil	Marcus Hook	–	120
		40	690

duces acrolein, satisfying an estimated 2-3-million-lbs./year market. Output primarily goes for use as an intermediate in the production of methionine, a feed supplement. (Principal acrolein consumers are Du Pont and Monsanto.)

Recently published accounts peg Union Carbide's acrolein process as one involving the "condensation of formaldehyde with acetaldehyde"; but while the firm will not discuss methods of production, it's fairly certain that the route is a direct oxidation of propylene. This is similar to the process Shell will use at Norco, and there are some in the trade who believe that Carbide is operating under a licensing arrangement with Shell that, at least, covers several phases of acrolein chemistry.

There's no doubt, though, that Shell is pouring a pile of money into development of what are still, essentially, only prospective end-uses for acrolein. The material has few solid commercial outlets. In fact, some Shell people admit that the years-long investment is based much on "faith." But the attractive cost of producing acrolein in a large-scale operation, plus a plethora of potential uses, is likely to pay off.

Some potentially large acrolein derivatives: glutaraldehyde (for tanning leather), glycidol, glyceraldehyde, acrolein dimer for hexanetriol, acrylic esters.

HP Hypo: U.S. hydrogen peroxide consumption, now bouncing along briskly as a result of stepped-up demands from textile, and pulp and paper consumers, will likely increase a good 10% more when Shell gets rolling with its new glycerine plant.

Bleaching and oxidizing of various textiles, of course, will continue to take the major share of total U.S. HP production. In '60, this could amount to nearly 43% (about 25 million lbs.) of the estimated near-60 million lbs. of anticipated output.

Pulp and paper customers, after a lagging '58, appear to be well on the way to a 10-million-lbs./year HP buying spree. Correspondingly optimistic increases are also expected in such outlets for hydrogen peroxide (and derivatives) as cosmetics, drugs, epoxy compounds, and in foaming of rubber latex, polystyrene and polyurethanes.

More Pat than Impact: Surprisingly, the future for allyl alcohol will not be significantly affected by the new Shell glycerine synthesis. The current allyl alcohol production method (via the caustic hydrolysis of allyl chloride in the making of "conventional" synthetic glycerine) is expected to be less costly than Shell's upcoming route.

Allyl alcohol markets are relatively small; the largest is perhaps the resinous polymers produced by the polymerization of the alcohol and its esters. The only current producers of allyl alcohol are Shell and Dow.

Propylene uses in principal derivatives

Derivative	*Conversion factor**
Isopropanol	0.9-0.95
Low-molecular-weight polymers (tetramer, trimer, pentamer, etc.)	1.0
Propylene oxide	0.9
Synthetic glycerine	0.67
Polypropylene	1.05
Cumene (for phenol)	0.37
Oxo chemicals**	0.75 ave.
Misc. (allyl chloride and alcohol, acrolein, epichlorohydrin, acrylonitrile, etc.)	—
Totals	

*Pound of propylene per pound of derivative.
**Excludes decyl alcohol figure, which is included in trimer data.

ACRYLONITRILE

Propylene consumption by the acrylonitrile plant Sohio is now building and Du Pont's proposed Beaumont installation will be rather minor, compared with current requirements for acetylene in U.S. acrylo manufacture. Nearly 69% of acrylonitrile capacity is based on acetylene raw material. Producers: American Cyanamid (Fortier, La.); Monsanto (Texas City, Tex.); and B. F. Goodrich (Calvert City, Ky.).

In addition, Du Pont will build an acetylene-hydrogen cyanide acrylo plant at Memphis, Tenn. (*CW, June 27, p. 25; Oct. 17, p. 35*), and Dow's now-shelved plans also called for the acetylene route.

(The other acrylo plant, Union Carbide's Institute, W. Va., facility, uses ethylene oxide.)

Neither future propylene-ammonia acrylonitrile producer has stated capacity figures, but indications are that Sohio's Lima, O., plant is about a 40-million-lbs./year unit, and Du Pont's will probably be in the 25-30-million-lbs./year range.

POLYPROPYLENE

Will polypropylene follow polyethylene's explosive growth pattern? It may. But at least a dozen U.S. companies now spending millions for new plants and development would like to know for sure.

It's a tough question for a number of reasons:

• Although polypropylene has been in commercial production for about two years, its sales, compared

(million pounds of propylene)

1955	1956	1957	1958	1960	1965
790	980	1,100	950	1,110	1,270
520	570	540	560	600	650
63	77	97	112	144	198
54	60	67	57	90	134
—	—	—	5	53	420
41	59	63	66	74	92
100	107	105	120	143	175
12	16	18	25	45	115
1,580	1,869	1,990	1,895	2,259	3,054

U.S. production of principal propylene derivatives

(est. million pounds*)

	1955	1956	1957	1958	1960	1965
Isopropanol	855	1,063	1,191	1,029	1,200	1,370
Low-molecular-weight polymers (tetramer, trimer, pentamer, etc.)	520	570	540	560	600	650
Propylene oxide	70	86	108	125	160	220
Synthetic glycerine	80	90	100	85	135	200
Cumene	110	160	170	177	200	250
Polypropylene (plastic, fiber)	—	—	—	5	50	400
Oxo chemicals (alcohols and adehydes)	155	165	160	185	220	270

*CW estimates based on Tariff Commission and trade data.

with sales of other resins, are still in the toddling stage.

• Overoptimism concerning consumer acceptance of polypropylene end-products could develop the same tendency toward overcapacity that characterized the market for conventional polyethylene a few years ago, and which is becoming evident in linear polyethylene.

• Despite the lengthening list of polypropylene producers, there is not yet a uniform market price on the raw material for the polymer, high-purity propylene.

For nearly five years, the "new" polypropylene has been talked up generally as the "next big-time plastic."

When Giulio Natta's work on polypropylene was first revealed in '56, at least 15 American firms approached Chemore, Montecatini's U.S. representative, for rights to commercialize the process. Reportedly, the Italian firm was not then ready to license. Consequently, many of these companies decided to step up their own research programs rather than wait.

Meanwhile, as Natta's work was progressing, at least three U.S. firms succeeded in production of isotactic polypropylene by their own methods: Hercules Powder, Phillips, and Standard Oil of Indiana.

Of the three, only Hercules, with an assist from Farbwerke Hoechst, crash-programed into commercial production in just a little more than three years.* (Phillips and Indiana Standard have not yet publicly revealed their plans for commercial entry into polypropylene.)

*Both Hercules and Montecatini announced independently and coincidentally in Dec. '57 that they had polypropylene ready for commercial production.

Despite the early flurry of potential producers, only within the past few months has Hercules lost its title as the only commercial U.S. producer of polypropylene. In midsummer, AviSun (a joint American Viscose-Sun Oil venture) began turning out the resin in facilities leased at Koppers' former linear polyethylene plant at Port Reading, N.J.

Texas Eastman (a manufacturing division of Eastman Kodak) reports that it has started "limited" commercial production of polypropylene at Longview, Tex. In full-scale production (mid-'60), the plant will probably have initial capacity of 30 million lbs./year.

At the moment, all U.S. capacity (including Hercules' and AviSun's 20 million lbs. apiece, Texas Eastman's current unit, and several "pilot-planting" units all over the country) probably totals no more than 60 million lbs./year.

But note how the field will crowd up within the next couple of years:

Humble Oil (Standard Oil Co. of New Jersey) is building a 40-million-lbs./year plant at Baytown, Tex., expandable to 100 million lbs. AviSun is planning an additional polypropylene facility that would increase its capacity to 100 million lbs./year. Hercules will up its present 20 million lbs. to about 50 million lbs./year, and will definitely build another plant (with capacity of possibly 100 million lbs./year) on the Gulf Coast. High-purity propylene for Hercules' proposed plant will likely be supplied by Petroleum Chemicals.

Early last month, Dow—long considered a dark

horse in polypropylene circles—stepped out with word that it would be producing "modest" quantities at Bay City, Mich., early in '60, and was planning a larger plant at Torrance, Calif., due in '61. Dow, of course, rarely discloses capacity figures, but it's a good bet that the Bay City installation could make about 10 million lbs./year, and the Torrance project 25-30 million lbs./year.

In addition, Novamont now says it will build a 25-million-lbs./year plant at Neal, W. Va., instead of the earlier-reported 11 million lbs. unit. Operation is due early in '61.

And Goodrich-Gulf is on the verge of making an "important" disclosure concerning polyolefins that will probably include plans for polypropylene production.

Other potentially large-scale polypropylene producers include Allied Chemical, Amoco Chemicals, Firestone Tire & Rubber (*CW, Sept. 26, p. 22*), W. R. Grace, Koppers, Monsanto, National Distillers, Phillips, Shell, Union Carbide, Spencer—and possibly a half-dozen others.

The imposing array of producers (*see table, p. 65*), could push U.S. polypropylene capacity to nearly a half billion lbs. by the end of '61—and this may well double by '65.

Some marketing "experts" foresee a rapid blooming of polypropylene markets in film, fibers and plastic products that will require about 1 billion lbs. of resin annually in five or six years. More sober estimates, however, peg such demand at nearer 400 million lbs./-year by '65. But even this estimate would indicate nearly a 10-fold increase in U.S. production.

It's been said that polypropylene came along a little too soon. Linear—low-pressure, high-density—polyethylene, admittedly superior in some respects to conventional polyethylene, has barely begun to move into worthwhile volume markets. Sales this year, for instance, may reach 85 million lbs.; total U.S. capacity is approximately 300 million lbs. Conventional polyethylene sales should be well over 1.1 billion lbs.

With some minor modifications in process and equipment, polypropylene can be made in facilities for low-pressure polyethylene. This plus polypropylene's substantial, but still unfathomed, prospects has caused some polyolefin producers to decide to de-emphasize linear polyethylene plans in favor of the newer product.

Price Pressures: Competition, broadening markets or excess capacity inevitably bring about lower selling prices. Such has been the case with the polyethylenes and with polyproplyene.

Following months of price shading and other under-the-counter deals as a result of the then-mushrooming conventional polyethylene capacity, the industry had, by early '57, generally settled on an official quote of 35¢/lb., about 6¢ less than the previous posted price. Such a base price has been maintained.

Price cuts on linear, however, sparked by some sharp competitive moves (*CW Market Newsletter, March 1, '58; Jan. 17; Sept. 26*) have been ruthless. Frequent slashes have brought the mid-'57 47¢/lb. price down to 38¢. And late last month, Celanese, Grace, Koppers and Union Carbide were quick to follow a 3¢/lb. reduction on high-melt index material posted a week earlier by Phillips.

Polypropylene price declines initiated by Hercules since its Dec. '57 introduction of the material have also been severe. Hercules admits that the reductions were made to encourage acceptance of the newer resin by somewhat-hesitant fabricators and formulators. Polypropylene first sold at 65¢/lb., is now down to 42¢.

There is, of course, much speculation in the trade on future pricing levels. And there are some who believe that all three polyolefins will be priced lower within the next couple of years. Their predictions: conventional polyethylene tags at slightly under 30¢/lb.; both linear polyethylene and polypropylene at about the same price—32¢ or 33¢/lb.

PROPYLENE

Availability of propylene itself—of low, medium or high purity—will scarcely be a problem to the growing ranks of consumers. The reason: propylene differs dramatically from most chemical raw materials in that it is produced economically only as a by-product or as a coproduct.

Bulk of U.S. propylene requirements—well over 90%—comes from refinery cracking operations. The other (a growing source) is as a coproduct in the production of ethylene from C_3 or higher hydrocarbon feedstocks.

Total propylene potential from these sources, most trade researchers agree, will be close to 22 billion lbs. annually within a year or so. More than 19 billion lbs. will be accounted for by refineries, and the rest will come from ethylene facilities.

(At least one major marketer takes exception to the 22-billion-lbs. figure, though, judging that total U.S. propylene yield is 8 billion lbs./year less. The difference may be attributed to assumptions made on yields from catalytic cracking and other refinery operations.)

At any rate, based on the more widely accepted figure of 22 billion lbs. of available propylene, less than 10% is currently used for petrochemical manufacture; nearly three-quarters is consumed at refineries as feedstock for alkylation (high-octane gasoline) and polymerization (aviation gas). The remainder is accounted for by fuel use, losses, etc.

By '65, the petrochemical share of available propylene will grow to just under 13%. But even this comparatively thin slice of the total amounts to a thick chunk of chemical raw material. Translated into pounds requirement, the chemical take will come to about 3.1 billion lbs. by '65.

Refineries, of course, will continue to need the bulk of the propylene produced for upgrading into gasoline components. On the other hand, new and projected ethylene plants utilizing the cracking of propane-butane feedstocks should increase ethylene's contribution to the anticipated '65 propylene supply (about 24 billion lbs.) by at least 500 million lbs./year (*see table, below*).

Purity Poser: While supply raises no problem for consumers, the matter of propylene purity does. The general run of refinery propylene, and the propylene yielded in production of ethylene via cracking, is actually a propane-propylene mixture containing 40-60% propylene.

For the older propylene outlets (IPA, tetramer, trimer, polymer gasoline, propylene oxide, etc.), the mixture can be used as produced, without processing complications.

Only since the advent of the newer end-uses, such as allyl chloride and acrolein, oxo chemicals and polypropylene, has purification of the propane-diluted raw material been necessary.

Material of 90-95% propylene content—available from most ethylene plants that use the higher hydrocarbon feedstocks—may contain enough impurities to warrant special (and in some cases, costly) processing to raise purity to standards that are becoming much needed.

In the manufacture of polypropylene, for instance, propylene of very high concentration (99+%, and free of even trace contaminants, particularly dienes and acetylenes) is mandatory.

Until recently, bulk of U.S. propylene has been produced captively by chemical firms and petroleum refiners. Only relatively small quantities have been sold to chemical makers on a spot or on a year-to-year basis. This merchant material (generally 90-95%, and not suitable for polypropylene manufacture) has been quoted at prices slightly under 2½¢/lb. These isolated deals, however, cannot be considered as models for future propylene pricing, since the contracts involved were of short-term duration and opportunistically written. One typical provision: the seller had the option of slicing off supplies on brief notice.

To date, no volume market nor uniform price has been established for polypropylene-grade propylene as

Propylene: where it comes from . . .

	1958 billion Pounds	*Percent*	*1965 billion Pounds*	*Percent*
Refinery gas	19.5	90.7	21.5	89.6
Ethylene plants	2.0	9.3	2.5	10.4
	21.5	100.0	24.0	100.0

Where it goes

Refinery use (alkylation, polymerization), fuel, losses, etc.	19.4	90.2	20.9	87.1
Chemical manufacture	2.1	9.8	3.1	12.9
	21.5	100.0	24.0	100.0

there has been for ethylene used to make polyethylene.

In fact, the propylene situation today is, in many respects, similar to the disordered ethylene market prior to Gulf's pattern-setting of ethylene contracts in the fall of '50 (*CW Ethylene Report, May 9*).

As the U.S. polypropylene field crowds up (*see table, p. 65*), the necessity for a uniformly priced high-grade propylene becomes more obvious, since the plastic, fiber and rubber resin will likely become the largest consumer of contaminant-free, 99+% material.

Who's First? It's difficult to say who will blaze the high-purity pricing trail, since just about all potential high-purity propylene producers (*see table, p. 65*) are quoting varying prices to prospective customers. Most of these quotations, however, reportedly fall within a range of ½¢-1¢/lb. under going ethylene prices.

Thus, it's more than likely that high-purity propylene schedules will be set—and probably in the very near future—at a base level of about 4½¢/lb. Chances are, too, that propylene contracts will generally follow the pattern of ethylene contracts, even to escalation clauses affecting the base price.

But the trade is far from certain that these prices will be happily received by potential high-purity propylene customers, since propylene has for years been considered a much cheaper raw material than ethylene because of its by-product status. Thus, it was hoped this would give polypropylene a considerable price advantage over polyethylene.

But the picture is different on the other side of the propylene counter. With current low-purity propylene selling at about 2½¢/lb., the apparent 2¢ differential between low-purity and high-purity propylene appears to be mighty attractive to the slew of refiners sighting on the high-purity market (*see table, p. 65*). If all the probable high-purity merchants were to maximize production, nearly 700 million lbs. of material would be available for prospective polypropylene makers—enough to cover requirements for at least six years.

Today, the only commercial merchant of high-purity propylene in the U.S. is Sinclair Petrochemicals. The company is supplying material for Hercules Powder's 20-million-lbs./year polypropylene facility at Parlin, N.J. Reportedly, it is also providing raw material for AviSun's polypropylene units at Port Reading until Sun Oil's upcoming propylene plant at Marcus Hook, Pa., is ready to take over the job.

Sinclair's purification facilities (also at Marcus Hook) can currently produce 35-40 million lbs./year of top-grade propylene, but the firm is considering construction of a larger-scale high-purity installation at one of its three major refineries—Chicago, Philadelphia or Houston.

Esso Standard at Baton Rouge, La., probably has the largest maximum potential for producing high-purity propylene, but the steam cracking process it uses is said to pose some purification problems.

Despite Esso's whopping propylene potential, affiliate Humble Oil will make its own propylene raw material for the polypropylene plant it's building at Baytown, Tex. The reason: Humble has well over 50 million lbs. of readily available propylene that will dovetail neatly into the plastic project.

Nevertheless, Esso has been quoting high-purity propylene prices with Baton Rouge as the point of origin. And since the quotes are said to be competitive with those offered by other hopeful merchants, it's apparent that Esso's purification hurdles are not insurmountable.

An apparent omission from the list of probable high-purity merchants is Ashland Oil & Refining (Cattlesburg, Ky.), which will supply propylene for Novamont's upcoming polypropylene plant. The explanation: Ashland's material will not be high-purity, and will be upgraded by Novamont itself.

Mobil Oil, PCI and Phillips round out the list of avowed merchants scouting for high-purity propylene customers, but there will be more. For example, there's no word yet on who will supply Dow's planned polypropylene plant at Torrance, Calif. One of the nearby refineries, doubtless, will get the business: Shell and Richfield are at Wilmington, Calif.; Standard of California is at Richmond; General Petroleum, a Socony Mobil subsidiary, is located at Torrance.

There's a question, though, as to what grade of propylene Dow will buy. The company, like Novamont, may decide to do its own purification from a purchased 90-95% propylene stream in an over-the-fence deal.

Tank-Car Tangle: Unlike ethylene customers who for the most part must be pipeline-tied to the raw-materials source, propylene users can be serviced via tank car or tank truck.

But transportation raises a surprisingly little mentioned hurdle to the anticipated wider use of over-99% propylene—a serious shortage of suitable tank cars. Probably not more than 200 tank cars available in the U.S. are rated at great enough pressures to ship the higher grades of propylene. In contrast, there are thousands of cars for liquid petroleum gas.

Although some of these LPG units—in a few critical instances under satisfactory conditions (winter weather, for one), and with ICC approval—were pressed into service for propylene delivery, LPG cars can't normally be used for high-purity propylene.

The problem isn't acute yet, say propylene producers, but the production of higher-rated tank cars will soon have to match expansions slated in polypropylene.

The need for suitable tank cars to meet the growing requirements for high-purity propylene merely underscores the hustling changes in all segments of the propylene-based industry. The new plants, the newer derivatives—despite the new problems—will by '65 push propylene to the fore as a top basic olefin in the over-all U.S. chemical production surge.

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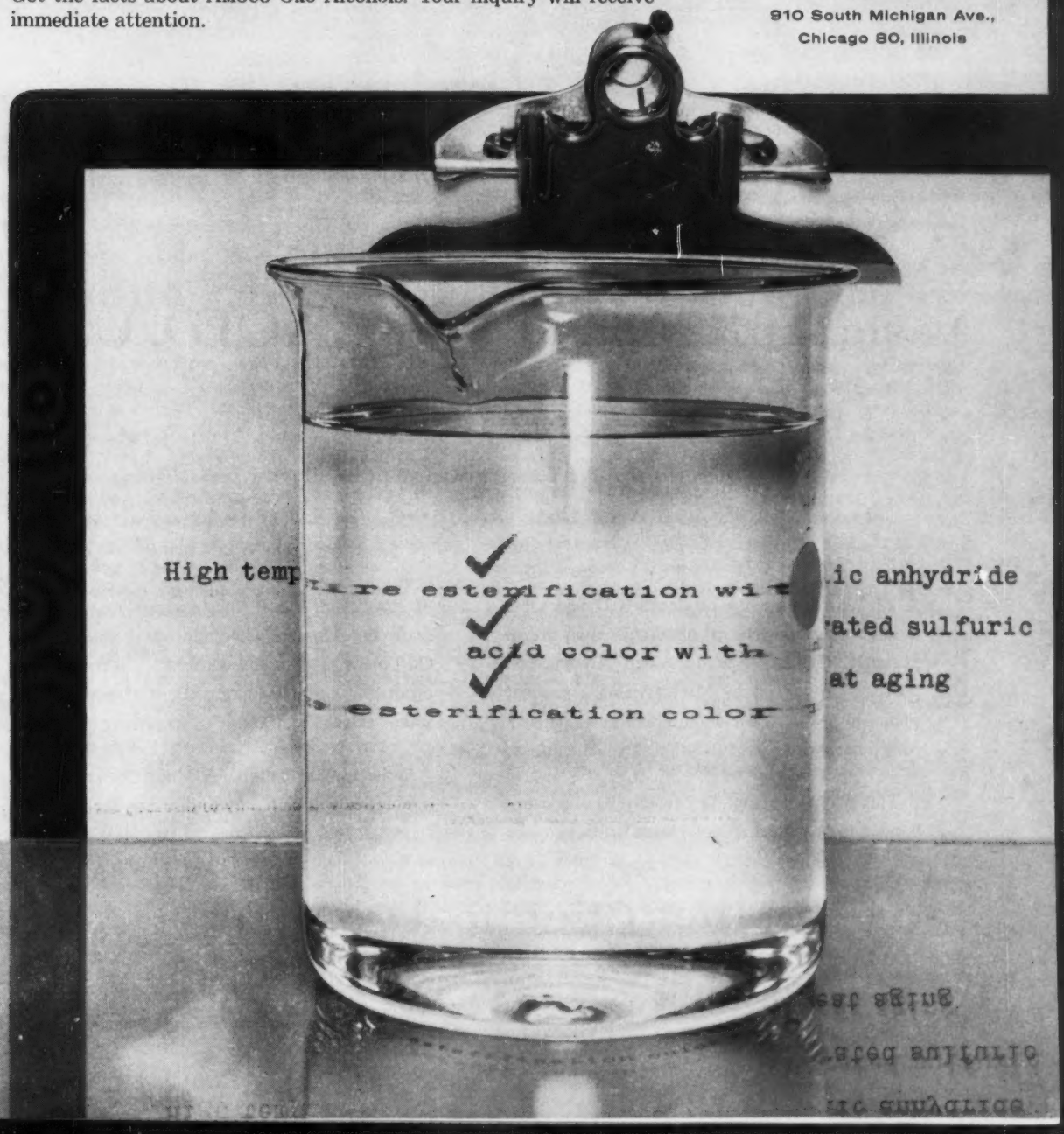

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Du Pont staffer demonstrates elasticity of new 'spandex' fiber, featuring high strength in low deniers.

Urethane Fiber—Winner in the Stretch?

First of the new "spandex" fibers —the new generic name for elastic, urethane-based materials — will be commercialized soon (CW Technology Newsletter, Nov. 7). After an outlay of more than $10 million and 15 years for research, Du Pont will build a new plant at Waynesboro, Va., to make Lycra, which will be aimed at many of the jobs now performed by rubber thread. And U.S. Rubber is expected to launch its competitive spandex fiber soon.

First Lycra unit, at the site of some of Du Pont's fiber R&D (e.g., Orlon, acetate) and acetate manufacturing facilities, is planned for completion by the third quarter of '60. Subsequently, units will be added, with the ultimate plant (capacity undisclosed) employing 250. Meanwhile, supplies of the fiber will be limited.

Room for More: U.S. Rubber, which has been evaluating its competitive Vyrene fiber since early '54, is believed close to commercialization. A pilot plant has been in operation at Gastonia, N.C., for about a year, and a commercial plant at the same site reportedly may be built in '60.

And Firestone Rubber & Latex Products Co. confirms trade talk that it has a urethane fiber under development at Fall River, Mass., and that it expects to announce commercial plans soon.

Farbenfabriken Bayer AG. (Leverkusen, Germany) recently dropped its urethane fiber effort in favor of caprolactam and acrylonitrile projects. Reason: Bayer decided urethane couldn't compete with more conventional fibers in either price or performance, wasn't interested in a new entry for the elastic thread field. Mobay Chemical Co. (Pittsburgh) and Allied's National Aniline Division (Buffalo, N.Y.), both strong in urethane R&D, tell *CW* they haven't as yet come up with a fiber.

Lycra vs. Rubber: First uses of the new fiber will be in women's foundation garments and swim suits, might well extend to other items of apparel as well as a wide range of elastic applications.

Among Lycra's claimed features, compared with those of rubber thread: lower density, giving more yardage per pound; 650% elongation (comparable to rubber); two to three times the restraining power; availability of finer deniers, which allow sheerer garments; greater flex life and durability after repeated home laundry washing and drying; better dyeing characteristics; and ability to be used without covering.

Long-Term Project: Du Pont researchers started looking for a marketable urethane fiber in the early '40s. One big problem was enhancing dye receptivity. Says Du Pont, "Lycra requires more complex chemical reactions than any of the company's other synthetic fibers, and represents a technical achievement that has long been a challenge to polymer scientists."

In April '58, field tests were started, and Lycra (as Fiber K) has since been evaluated for use in foundation garments through test retail sales, consumer panel comparisons and laboratory tests. Results: encouraging. The biggest hurdle now foreseen is

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Product Research and Development—A few years ago Snell was retained to develop new products, applications, and markets for sugar. Extensive research and development work by Snell resulted in the creation of a new synthetic detergent—based on *sugar!*

Product Application—A Snell client in the paper industry, for whom we had developed a fine additive, wanted to explore uses in other fields. Unfortunately, their highly qualified staff's experience was limited to the one field. Snell, with experts in practically every product field, found the new product has potentialities as both a good emulsifier and a paint plasticizer. Only the very largest manufacturing companies can duplicate the breadth of experience and background the Snell "brain-trust" of technical experts can offer you!

Product Improvement—One Snell client found their product, an adhesive bandage, slipping in quality. Tape was going gooey in storage on druggists' shelves. Snell research helped this client bring his product quality up to equal the best on the market, and retain his share of sales.

Product Evaluation—A Snell brewery client wanted to expand production and take advantage of a more efficient production technique but feared the taste of the beer might suffer. Snell food technologists, taste panels, and engineers checked the new process and hundreds of samples of beer made under new and old systems, recommended the switch to the more profitable modern process. The change went unnoticed by the customers, and sales continued to climb.

Market Research—A Snell client with a waste product had briefly considered building a plant to use it to manufacture another product; but had given up after their own brief survey showed the new product to be already overproduced. When they consulted Snell for checking, however, Snell predicted there would be a shortage within three years. The client waited two years, built the plant—and now has a profitable new product instead of a waste!

Toxicology—One of the largest frozen food companies began getting complaints on the flavor of one of their green vegetables. Since hundreds of thousands of dollars were at stake, they consulted Snell to find out what was wrong. Snell by analyzing tests, and checking on the farm, was able to prove that the taste—actually toxic—was due to a new type of insecticide sprayed on the fields hundreds of yards away on a windy day long before the harvest!

Engineering—A large midwestern firm desired to produce its own brand of instant coffee, to possess outstanding flavor, body, and bouquet. They engaged Snell to design their extraction line, which is now economically producing a superior product, and have since doubled capacity. Since that time, two additional plants have been modified under our supervision to increase production and improve product characteristics.

What's Your Product Problem?—Whatever it is, and whatever your product field—chemicals, chemical specialties, personal products, pulp and paper, protective coatings, plastics, textiles, foods, petroleum, rubber—Snell has men who "know the score" in that field, and who can work with you creatively and profitably in developing, producing, protecting, and marketing new ideas. This broad experience can be decisive in protecting not only your ideas, but also the thousands of dollars you spend developing them. And the cost of Snell service is less than you might imagine! Half the jobs we do cost less than $1000!

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RESEARCH

selling the material to women who may initially mistake its light weight for flimsiness.

The nature of Fiber K was a well-kept secret until early this year. Then the Federal Trade Commission picked "spandex" as the new generic name for fibers consisting of at least 85% urethane. And it became clear that a new type of commercial fiber was on the way.

Healthy Price: Lycra's price ranges from $4.75/lb. for 560-denier (7,970 yards/lb.) to $9.80/lb. for 70-denier fiber (63,780 yards). Other available deniers will be 140, 280 and 420. All sizes are supplied as zero-twist yarn in which a number of filaments have been fused to form a monofilament. Price of 90-gauge uncovered rubber thread—equivalent to 560-denier—is $2.07/lb. Du Pont is counting on Lycra's strength and other advantages to bridge this price gap. And 125-gauge (280-denier) is about the finest-gauge rubber available.

At least one company, the maker of Catalina swimwear, has already evaluated and adopted the urethane fiber, awakening new CPI interest in urethane's future.

LITERATURE

- The 11th edition of "Industrial Research Laboratories of the United States" is now being compiled by the National Research Council (Washington, D.C.). Publication is scheduled for mid-'60. About 6,000 laboratories will be described.
- General Electric Apparatus Sales Division (Schenectady 5, N.Y.) offers a new bulletin (GEA-6934) describing its irradiation services.
- The Chemical Rubber Co. (2310 Superior Ave., Cleveland 14) is out with its new 3,400-page, 41st edition of "Handbook of Chemistry and Physics."
- An eight-page technical memorandum on "Temperature Standards at 0 C" is available from Trans-Sonics, Inc. (Burlington, Mass.).
- "Facts on Testing (No. 5901)," describing new testing instruments and techniques, is available (free) from Thwing-Albert Instrument Co. (Penn St. and Pulaski Ave., Philadelphia 44).
- Bound volumes of reprints of Earl McBee's "Annual Review of Hal-

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Any liquid safe in polyethylene (including regulated products) can be handled, shipped and stored in the new 15 gallon WIREBOUND CUBITAINER. This expendable package — which meets industry and government standards for **safe** handling and shipping — consists of an unbreakable semi-rigid molded polyethylene insert, cushioned on six sides by corrugated material (including a handy pull-out flap), and nestled in a strong, lightweight wirebound wooden container.

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Rockaway, New Jersey

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RESEARCH

ogenation," covering the past 10 years, can be obtained from Columbia-Southern Chemical Corp., One Gateway Center, Room 2089, Pittsburgh 22, Pa.

• "Algae in Water Supplies," a report on an eight-year study, is available from the Superintendent of Documents, Government Printing Office, Washington, D.C. Price: $1.

• A new 12-page booklet, "Industrial Radiography with Radioisotopes," describing selection of the proper isotope and its use in radiography, is available (free) from Picker X-Ray Corp., a subsidiary of C.I.T. Financial Corp. (25 South Broadway, White Plains, N.Y.).

REPORTS

These reports are available from the Office of Technical Services, U.S. Dept. of Commerce, Washington 25, D.C.

• "Ceramics and Refractories, 1930-1959" (CTR-373, 10¢) is a new catalog listing all OTS's public reports on the subject.

• "Study of Limited-Type Ice Removal and Prevention Systems—Chemical Phase" (PB 151293, $2.75) is an Air Force report describing the best chemical and thermochemical methods of icing prevention.

• For sparingly soluble materials Air Force researchers developed "A New Instrument for the Determination of Molecular Weight by Differential Vapor Pressure" (PB 151832, $1). The instrument handles compounds in the 400-2,000-molecular-weight range.

EXPANSION

• Westinghouse Electric Corp. plans to centralize its research and development on a 100-acre Churchill Borough site, 10 miles from downtown Pittsburgh, Pa. Ground will be broken early in '60 for two new buildings to house 1,750 scientists, engineers and supporting personnel.

• A polymer chemistry research center, named the Camille Dreyfus Laboratory (after the founder and first president of Celanese Corp.), will be built in 4,500-acre North Carolina Research Triangle Park. Research Triangle Institute (Durham, N.C.) will own the lab, made possible by a $2.5-million grant from the Camille and Henry Dreyfus Foundation (New York).

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U.S.I. CHEMICAL NEWS

Nov. 14 ★ A Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1959

Ralph Knight Appointed U.S.I. Vice President

Ralph M. Knight, Manager of Polyolefin Planning for U.S.I., was recently appointed a Vice President. In his new position, Mr. Knight will intensify U.S.I's long-range polyolefin development program. He will continue to direct the Polymer Service Laboratory as well as to coordinate its efforts with other plastics activities within the company.

The newly created post is a reflection of the expanding role of polyolefin plastics in U.S.I.'s long-range growth plans. U.S.I. is currently the country's third largest producer of polyethylene, which it markets under the trade name PETROTHENE®. The company has underway an extensive expansion program which is expected to make it the second largest producer of polyethylene in the world by mid-1960.

Since joining the company in 1953, Mr. Knight has served as Polyethylene Manager, Polyethylene Production Manager, Assistant to the Vice President for Production, and Manager of Polyolefin Planning.

Chlorine Data Sheet Now Available from U.S.I.

Properties, shipping information and uses for liquid chlorine are detailed in a new data sheet just issued by U.S.I. Complete references for property data are included.

The material, which U.S.I. ships in 30-ton and 55-ton tankcars from Huntsville, Alabama, is used primarily in the bleaching of

MORE

Comprehensive Study Provides Data on Corrosion Resistance of Commercial Titanium-Base Alloys

Alloys Generally Corrode More Than Commercially Pure Titanium

An intensive research program to determine the corrosion resistance of seven of the most commonly used titanium alloys has recently been completed. Results indicate that in strong acids such as sulfuric and hydrochloric, the alloys generally have less corrosion resistance than commercially pure titanium itself. One exception—an alloy containing about 3% aluminum and 2.5% vanadium—has about the same degree of corrosion resistance as the unalloyed metal.

All seven alloys are reported to be completely resistant to solutions of ferric chloride, sodium chloride and sodium hydroxide and, with very few exceptions, to formic acid—under test conditions. Test results in aluminum chloride solutions were very erratic. However, they do indicate that under some conditions, these solutions can attack both titanium and its alloys very severely. In oxalic acid, all alloys corrode excessively.

The program revealed that polished surfaces are more corrosion resistant than pickled-finish surfaces, and that a high dissolved oxygen content in acid solutions slows corrosive action on both the metal and its alloys. The alloys tested, and their chemical analyses, are shown in table 2.

They were immersed for 336 hours in the following corrodents at 95°F. and/or 190°F.: 1, 3 and 5% hydrochloric acid, 5% sulfuric acid, 5% oxalic acid, 25% formic acid, 25% aluminum chloride, 25% ferric chloride, saturated sodium chloride and 25% sodium hydroxide. Studies were made without agitation of the corrosive solution, with air agita-

MORE

Methionine Indicated for Schizophrenia Treatment

Russian researchers have made a preliminary study which indicates that the sulfur amino acid, methionine, has a therapeutic effect in the treatment of schizophrenics. The treatment seems to give best results in the early stages of the illness.

The study was made with 20 patients, eight of whom had been ill for only a short time, with the disease in an acute form. The others had been afflicted for a long period. Methionine treatment was beneficial and helped normalize conditional and absolute reflex activity. In some cases the return of normal vascular reflexes preceded clinical improvements. Blood studies showed sharp changes in the index of thymol reaction and glutamine content of the serum after methionine treatment. The researchers analyzed the urine of the patients and confirmed improved nitrogen metabolism when methionine was administered.

It was noticed that patients become more communicative after treatment. Their appetite and sleep improved, along with their ability to take care of themselves. Psychopathological symptoms leveled off.

TABLE 1.

ALLOY	CORROSION RATES, mpy														
	190°F NO AGITATION					95°F AIR AGITATION					95°F N_2 AGITATION				
	1% HCl	3% HCl	5% H_2SO_4	5% Oxalic	25% Formic **	3% HCl	5% HCl	5% H_2SO_4	5% Oxalic	25% Formic **	3% HCl	5% HCl	5% H_2SO_4	5% Oxalic	25% Formic **
Comm. Pure Ti— 75 BHN	0.10	142	452	—	E	0.07	*	55.6	—	E	4.9	16.1	16.4	—	E
Comm. Pure Ti—120 BHN	3.3	140	254	1158	E	0.17	*	*	38.4	E	5.2	8.2	20.0	52.0	E
Comm. Pure Ti—180 BHN	0.17	196	571	705	E	0.03	*	9.96	20.7	E	5.1	10.4	17.5	32.7	E
Comm. Pure Ti—200 BHN	0.10	216	560	801	E	0.07	*	8.4	14.0	E	6.4	11.1	31.1	32.7	E
MST 8 Mn, Annealed	0.29	233	877	588	E	0.13	28.6	17.0	47.9	E	9.24	17.9	41.9	82.7	5
MST 6 Al–4V, Annealed	59.5	357	872	1582	164	1.35	31.8	44.8	41.9	E	12.4	18.7	32.4	42.8	5
MST 6 Al–4V, Age Hardened	49.4	378	850	983	164	4.05	26.6	26.9	25.7	E	7.97	16.2	29.8	61.9	5
MST 5 Al–2.5 Sn, Annealed	83.2	588	1230	1877	E	13.7	36.6	43.7	57.1	E	22.8	38.5	52.9	43.4	E
MST 821, Annealed	1.46	313	646	1418	E	0.46	14.7	37.2	54.4	E	9.85	16.6	23.7	62.2	E
MST 2.5 Al–16V, Solution Treated	3.4	160	591	561	50	0.49	5.2	0.65	23.8	E	5.47	9.8	21.4	20.2	E
MST 2.5 Al–16V, Age Hardened	3.7	211	660	988	50	0.23	14.2	24.0	22.6	E	9.11	17.6	38.0	20.6	E
MST 185, Annealed	37	430	888	582	E	0.06	*	*	21.8	E	12.9	19.8	43.5	19.0	E
MST 185, Age Hardened	74	450	946	1039	E	0.33	*	*	33.5	E	14.6	22.3	45.5	40.3	E
MST 3 Al–2.5V, Annealed	0.30	147	667	1028	E	0.10	0.05	*	23.1	E	5.01	7.43	16.4	24.8	E

* results erratic ** no tabular data except as shown. E indicates complete resistance.

Nov. 14 ★ **U.S.I. CHEMICAL NEWS** ★ 1959

CONTINUED

Chlorine

pulp and paper, in the manufacture of chlorinated solvents, in making plastics, resins, automotive fluids, insecticides, herbicides, refrigerants, propellants, and in water and sewage treatment.

The data sheet can be obtained from U.S.I. sales offices or from the Chlorine and Caustic Soda Sales Department, 99 Park Avenue, New York.

Have you a new product to tell the world about?

Make it routine to send your publicity releases to the Editor, U.S.I. Chemical News, often called the "Front Page of the Chemical Process Industries."

CONTINUED

Titanium Alloys

tion and with nitrogen agitation.

Actual corrosion rates in mils per year (mpy) are shown in table 1. The following ratings permit interpretation of these mil-per-year figures:

Corrosion rate, mpy	*Rating*
less than 0.5	Excellent
0.5 to 5.0	Good
5.0 to 10.0	Fair
more than 10.0	Poor

The alloys rated about as follows in the tests, starting with the most highly corrosion resistant:

(1) MST 3A1-2.5V
(2) MST 2.5A1-16V
(3) MST 8A1-2Cb-1Ta (821)
(4) MST 1A1-8V-5Fe (185), MST 8 Mn, MST 6A1-4V
(5) MST 5A1-2.5Sn

New Synthetic Ketone With Fresh, Leafy Odor Gives Soap Perfumer New Tool

A new synthetic aromatic ketone, related in activity to a group of trace constituents of essential oils, has recently been discovered and found to possess the soap-scenting effectiveness usually associated with natural materials. Thus the new synthetic material is reported to give the perfumer a new tool for achieving lasting, strong, stable and fragrant soap perfumes with increasing independence from the essential oils.

Although the characteristic, fresh, leafy note of the ketone is not new—an almost identical note being found in petitgrain oil—the new ketone is said to offer many possibilities for original perfumes not possible with petitgrain oil itself. This because it is a concentrated note free from terpene and other ester components that would hamper its adaptability. The material is offered for use by the soap perfumer in petitgrain, bergamot, lavender, vetiver, lemon, neroli and geranium type compositions.

Tests were performed with the new ketone in soap bars and powders, and liquid and powdered detergents. In all cases, the material was reported to give a strong fragrance which lasted, unchanged as to strength and character, through accelerated aging tests.

When incorporated into soap bouquets, the ketone is reported to contribute these advantages to soap cake fragrance: cakes retained their fresh note long after identical cakes without the ketone became flat and lifeless; cakes gave a more diffusive fragrance than identical cakes without the ketone; cakes containing the ketone were judged to have a more refreshing and exhilarating scent.

TABLE 2: CHEMICAL ANALYSES OF TITANIUM ALLOYS USED IN CORROSION TESTS

ALLOY	% O_2	% N_2	% C	% H_2	% Fe	% Al	% V	% Mn	% Cb	% Ta	% Sn
MST 8Mn	0.097	0.01	0.04	0.0062	0.13	..	..	8.2	..	..	..
MST 6Al-4V	0.059	0.011	0.04	0.0031	0.20	6.27	4.21	..	..	..	..
MST 5Al-2.5Sn	0.142	0.02	0.02	0.0032	0.19	5.00	..	..	..	..	1.99
MST 821	0.101	0.015	0.02	0.0062	0.25	7.96	..	..	2.25	1.01	..
MST 2.5Al-16V	0.093	0.015	0.04	0.0130	0.20	2.85	15.94	..	..	..	..
MST 185	..	0.004	0.02	0.0084	5.09	1.76	7.28	..	..	..	..
MST 3Al-2.5V	0.120	0.011	0.06	0.0020	0.17	2.91	2.45	..	..	..	..

TECHNICAL DEVELOPMENTS

Information about manufacturers of these items may be obtained by writing U.S.I.

Glycerine properties, reactions, performance are covered in new 20-page booklet now available. Describes all commercial grades and types; includes information on storage, shipping, handling; covers variety of known uses. **No. 1530**

Pilot scale versions of two commercial continuous centrifuges can now be obtained for clarifying, separating and concentrating in lab and pilot plant. One unit is for liquids with up to 20% solids, the other for up to 5% solids. **No. 1531**

Montmorillonite catalysts, made from bentonite and aluminum hydrosilicate and used mainly in reactions otherwise catalyzed with hydrogen acids, are now marketed in U.S. Characterized by highly selective catalytic activity. **No. 1532**

New type applicator for ether aerosol diesel starting fluid has been developed. Holds standard aerosol can and feeds fluid into intake manifold of engine through closed system. Said to give quick start without fluid waste of vapor escape. Is compact, fits any engine. **No. 1533**

New guide for fire and explosion prevention in plants producing and handling zirconium can now be purchased. Pamphlet outlines safeguards for fire prevention, dust collection, fire protection, and disposal of waste materials. **No. 1534**

Skin lotion to keep hands free from drying by solvents has been developed for use by chemists and clinicians working with acetone, methanol, ether, alcohol, xylene, benzene, chloroform, detergents, alkalis, etc. **No. 1535**

New facepiece for gas and hose masks, air line respirators, demand breathing apparatus, is now on market. Features easily replaceable, large single lens, improved speaking diaphragm, built-in accommodation for glasses, no fogging. **No. 1536**

Acid inhibitor has been made odorless, without changing inhibiting properties of product. Material is added in small amounts to acid pickling solutions to prevent attack of steel and copper, and reduce rust during steel drying. **No. 1537**

Laboratory production and use of sodium wire are outlined in new technical data sheet. Includes photo, diagrams, complete description of equipment; extrusion method; typical reaction of the wire in Bouveault-Blanc reduction. **No. 1538**

New Product for poison ivy treatment is said to act quickly by neutralizing ivy phenols which cause rash and itch. Works on ion exchange principle to convert toxic phenolic compounds to inactive phenolates. **No. 1539**

PRODUCTS OF U.S.I.

Alcohols: Ethyl (pure and all denatured formulas); Anhydrous and Regular Proprietary Denatured Alcohol Solvents SOLOX®, FILMEX®, ANSOL®M, ANSOL PR.

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Pharmaceutical Products: DL-Methionine, N-Acetyl-DL-Methionine, Urethan USP, Intermediates.

Heavy Chemicals: Anhydrous Ammonia, Ammonium Nitrate, Nitric Acid, Nitrogen Fertilizer Solutions, Phosphatic Fertilizer Solution, Sulfuric Acid, Caustic Soda, Chlorine, Metallic Sodium, Sodium Peroxide.

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Technology
Newsletter

CHEMICAL WEEK
November 14, 1959

A "bread-box size" gas turbine that operates on a wide range of fuels—from kerosene to highly leaded gasolines—has been developed by Williams Research Corp. (Walled Lake, Mich.). Weighing in at only one-third the weight-per-horsepower of other regenerative gas turbines, Williams' small, 75-lb. unit develops 75 shaft horsepower. Aircraft versions of the new turbine are to be available in about a year, and Williams has licensed a number of other manufacturers to produce units for ground applications.

•

Kaiser Steel's basic oxygen process has nearly doubled output rates at the company's Fontana, Calif., mill. Kaiser metallurgist J. E. Tredennick reported at last week's regional meeting of American Iron and Steel Institute in San Francisco that the highly accelerated oxidation process has boosted the production rate of a single furnace from 64 to 103 tons/hour (average cycle time for a heat yielding 110 tons of steel ingot is only 63 minutes). More research and development, Tredennick says, may further increase production rates.

•

Dog ticks succumb to a new insecticide combination worked out by University of California (Los Angeles) entomologist I. Barry Tarshis. The brown ticks, which have become resistant to a number of standard insecticides, are controlled by California Spray Chemical's Dibrom—O,O-dimethyl-O-(1,2-dibromo-2,2-dichloroethyl) phosphate — added to Davison's Dri-Die 67 silica gel dust.

•

A new dye receptor in Dow's Zefran acrylic fiber? Candidates for the job, currently held by polyvinylpyrrolidone (PVP), may emerge from Dow's success in direct vinylation of oxazinidinones and oxazolidinones, described in new patents U.S. 2,905,669 and U.S. 2,905,690. Both patents mention the term "dye receptor" in connection with monomers (e.g., N-vinyl-6-methyl-2-oxazinidinone; N-vinyl-5-ethyl-2-oxazolidinone) made by the new method.

•

"The purest crystal ever made of any compound" is Battelle Memorial Institute's description of an indium antimonide specimen it prepared for the Air Force Office of Scientific Research. For use in low-temperature transistors and infrared detectors, the crystal, Battelle reports, contains less than 10 parts per billion total impurities. It was made by zone refining, then pulling the crystal—all in a sealed system.

•

A new ceramic is challenging metals' high-temperature superiority in a wide variety of applications around 1200 C, where thermal shock requirements have previously excluded nonmetallics. The new material is basically a silicon nitride, stiffened by a 5% dispersion of silicon carbide to improve creep strength.

Britain's Admiralty Materials Laboratory developed the ceramic for use in gas-turbine stators, predicts it will find other high-temperature applications, such as electrical insulation on rocket launching platforms, catalyst supports, thermocouple sheaths, high-temperature furnace structures and containers for special purification and diffusion operations employed in semiconductor manufacturing. The carbide-stiffened silicon nitride can be formed to close tolerances by conventional machining, is said to withstand cracking for as many as 50 cycles of rapid heating to 1000 C and cooling to room temperature.

•

W. R. Grace & Co. will use an all-polyethylene cooling tower for expanded ammonia facilities at Memphis, Tenn. Grace Chemical President William Haude disclosed last week that expansion of the plant—from 100,000 to 160,000 tons/year—will start soon, with operations scheduled to begin in '61 and to reach design capacity by '62. Packing for the all-plastic cooling tower (redwood will be used only for external structural members) will be fabricated by Fluor Corp. from Grace's high-density polyethylene.

Though towers of all-polystyrene construction have become standard for handling clean water, such as boiler-water and air conditioning systems, polyethylene has been used only in replacement grids for wooden tower sections. Despite the higher cost of polyethylene, over-all economics favor its use, says Fluor, in installations where the higher efficiency of plastics offsets the added cost, and where presence of petrochemical contaminants in the water precludes the use of polystyrene.

•

A "glue" injected into the site of a bone fracture is under study by Milton Cobey, professor of orthopedic surgery at the Georgetown University School of Medicine (Washington, D. C.). Urethane adhesives have been used to mend fractured human bone laid bare by surgery. But the injection approach is new. Colbey says the principle is "not applicable to the human at this time," but he has developed a plastic that appears satisfactory in tests on rats and rabbits.

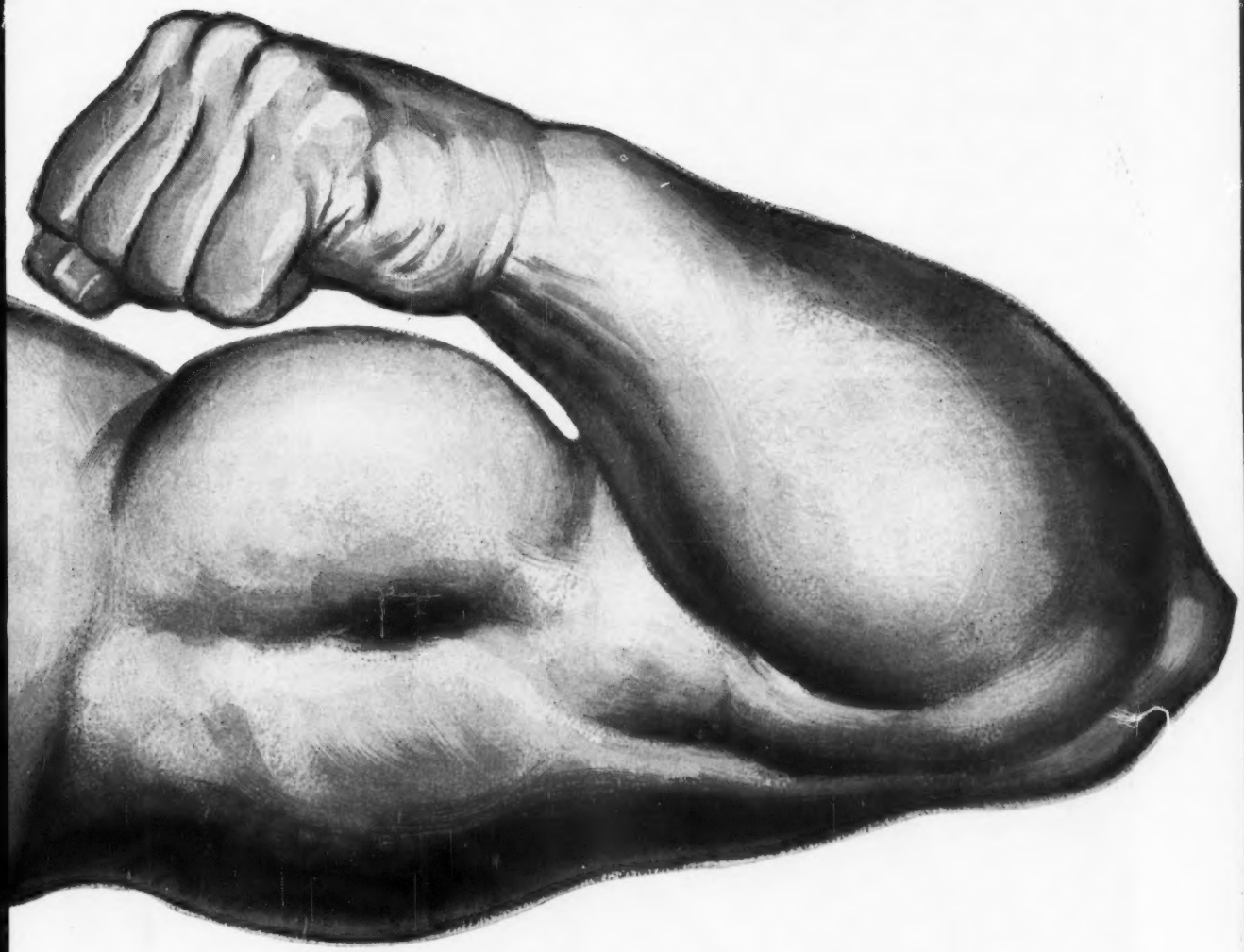
•

Standards for auto antismog devices have been set by the Los Angeles County Board of Supervisors. Cost must be less than $100; efficiency in removing pollutants, 80%; and minimum life expectancy at this efficiency, at least 25,000 miles.

•

A new trick for combating abrasive erosion of nuclear fuel is helping The Martin Co.'s nuclear division (Baltimore, Md.) to overcome a serious problem in the development of the liquid fluidized-bed reactor (LFBR). In normal operation of the LFBR, pellets of fissionable fuel are fluidized by water flowing up through a perforated plate, gradually wear away. Martin engineers Harold Barr and Donald Peterson discovered that the addition of powdered graphite reduces abrasion to less than 20% of that encountered in plain water, may provide a bonus of improved heat transfer characteristics of the system.

BLOCKSON TSP PUTS MUSCLE IN DETERGENTS



If you are looking for a good base to build an improved detergent, consider Blockson Trisodium Phosphate. Nothing beats it for removing fat- or oil-based soils. Its ability to saponify and emulsify is still unchallenged after three decades. That's why you find it in so many cleaning formulas and dish detergents and in the heavy duty, garage, dairy and metal cleaners, wall washes, etc. Fact is, whenever you have a need for ready available—yet buffered—alkalinity without harmful causticity, TSP is a preferred component.

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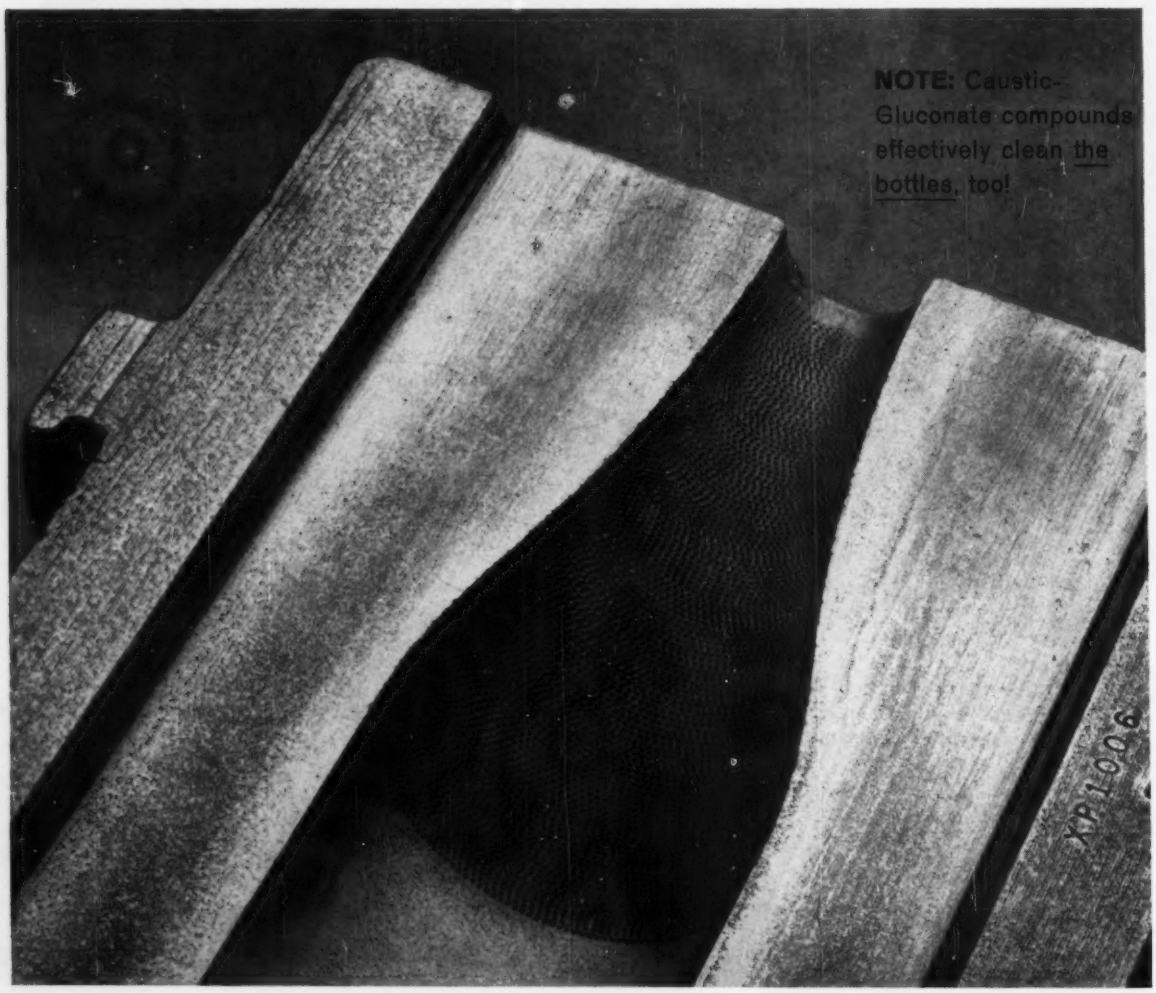

42 Products' Klein with Nelson and Sinclair—his recruits from the ranks of the retired.

Wanted: 'Bright Young Men,' Past Sixty

While most companies shy away from hiring retired executives for full-time jobs, Paul Klein, president of 42 Products, Ltd., Los Angeles toiletries maker, disagrees. For him, hiring retired men has been good business; with such help, his company has grown, in just four years, from a name and a line of inventory to a $2-million/year business.

This week he is looking for a man to set up a department to develop point-of-purchase merchandising aids. And he hopes he can find a retired executive, because he has found it pays to bring "old blood" into his firm to help give it new life.

The story of how Klein gave his company—and the oldsters in it—what is, in effect, a second crack at success goes back to Jan. '56. The preceding month, he and two partners had sold 42 Products to Helene Curtis Products, Inc.—which wanted to acquire the firm's nationally marketed Kings Men line of men's toiletries. Along with this it had to acquire 42 Products' line of women's hair preparations—marketed only in 11 of the Western states. Klein, and many others in 42 Products, had been offered a job with Curtis (his would have paid $50,000/year). But he turned this down to buy back from Curtis the line of women's hair preparations—which Curtis sold him for the cost of inventory.

Under terms of the original acquisition, Curtis had shut down the Los Angeles plant, sold off some of the equipment at auction and had the rest of it shipped to Chicago. Curtis had also acquired most of 42 Products' top talent.

Second Wind: One man whom Curtis had not absorbed was Chris Nelson, a research chemist who had been with 42 Products for a number of years. Because he was 60, he did not make the move to Curtis. It was this man to whom Klein looked for the technical know-how he lacked. Nelson snapped up Klein's offer to return to work.

Given virtual carte blanche, Nelson proceeded to find a plant site, pick out his equipment, and set up a production line. Within 10 days, equipment was installed in a 12,000-sq. ft. plant in Santa Monica. Soon afterward, a production line was ready to turn out 135 units/minute of bottled goods, using only two workers.

That took care of the plant; running an office was a different problem.

Again, Klein cast about for an in-

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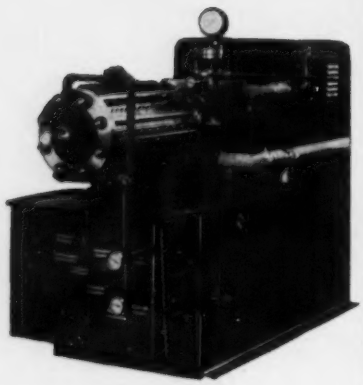

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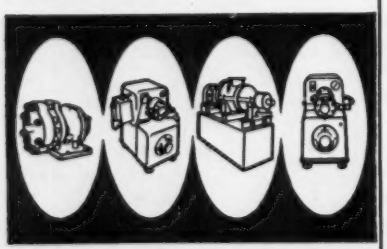

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voluntarily retired man. He found a knowledgeable and eager prospect in Kirkley Sinclair, a septuagenarian who had been retired from the Square D Corp., where he had been a controller. Living on social security and an annuity, Sinclair insisted that his salary be under $100/month so that he might continue to qualify for his social security benefits. According to his agreement with Klein, his hours would be flexible and he could set his own pace.

As it turned out, Sinclair put in vigorous, 10-hour days in planning a highly automated office that would use a minimum of help in processing billing, sales research and inventories.

With this nucleus, Klein hoped to rebuild 42 Products to the point where it could achieve and maintain its former peak volume of $350,000 in annual sales. Currently, the company's volume is past the $2-million/-year mark. It is still climbing.

The company has also gone back into the men's toiletries line after being out of it for a period of one year—as agreed in the sale to Curtis.

Facilities have been expanded to 20,000 sq. ft.; and next year, a new 70,000-sq. ft. plant will rise near the present site. The existing plant will be used for warehousing purposes only.

Age Is No Barrier: Although 42 Products has no particular program aimed at recruiting elderly executives, the performances of Nelson and Sinclair have pointed out to Klein the advantages of age and experience. As a result, age is no barrier to employment at the company. Ten percent of the firm's employees are past 60, and average age of employees is 44.

The disadvantage of high group insurance rates is more than offset, Klein says, by the infinitesimal rate of absenteeism among the older workers. Klein has worked out the problem of retirement plans by setting up a plan whereby the company, on behalf of the employees, invests in mutual fund stocks an amount equal to 10% of each worker's salary. Employees contribute nothing.

Age Conflict? Do younger workers feel that their own chances of advancement are being throttled by the presence of the ex-retirees? Klein thinks not. He reports that the old-timers are zealously cramming all their years of experience into their potential successors.

Cooler Up North

In a rainswept Northern city, under gray skies, the second annual meeting of the Canadian Manufacturers of Chemical Specialties Assn. took place at Toronto's Royal York Hotel last week.

If U.S. visitors to the meeting didn't learn much new from the technical papers presented, they did get a chance to observe at firsthand the growing nationalism taking hold north of the border. An awareness of this rising national consciousness—and its ramifications—could be valuable to all segments of the U.S. chemical industry in future dealings with their Canadian customers and suppliers.

Many U.S. executives at the meeting told *CW* that they felt a markedly cooler atmosphere at this meeting than they did at the last CMCS meeting, held a little more than a year ago.

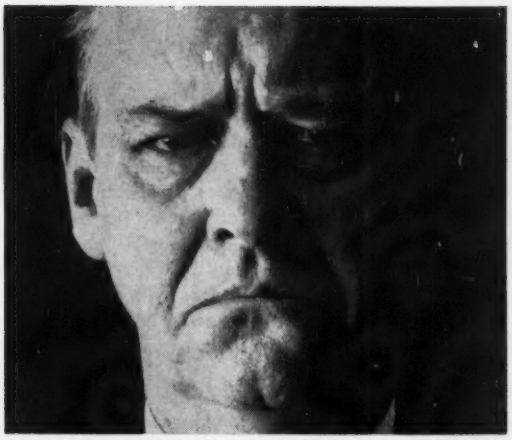
And many felt that their Canadian hosts could have shown more cordiality in welcoming U.S. companies to the meeting, others complained that not a single officer of CMCS had taken the trouble to visit the U.S. companies' hospitality suites.

It wasn't necessary to go to the CMCS meetings to sense the growing disaffection for the U.S. on the part of many Canadians.

Even in supermarkets there's evidence of the growing nationalism. A number of household cleaning products now have "All Canadian Capital" emblazoned on their labels.

At the CMCS too, where tariffs were the main topic of discussion, strong pro-Canadian sentiments were in evidence. Although many of the Canadian company representatives talk about the valuable contribution the upcoming tariff review will have on establishing a rational classification of chemicals—the existing law is a hodgepodge—it's obvious that they're looking forward to some stiff duties being slapped on incoming goods.

If Canadian chemical manufacturers, both basic and secondary, get their higher tariff — most trade observers peg it at 20%—on incoming goods, it will mean that many U.S. companies will have to think seriously about setting up Canadian operations. That move, they should be warned, would put them into the unpopular



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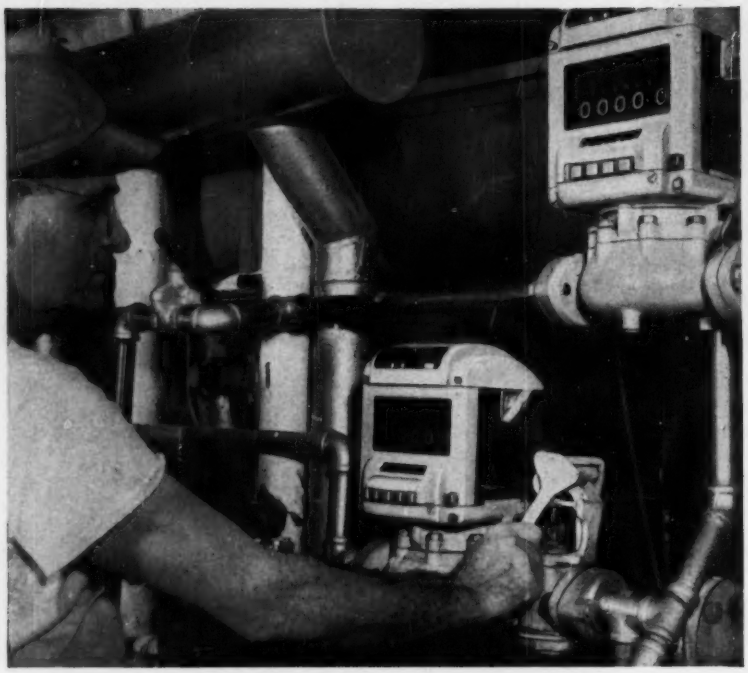

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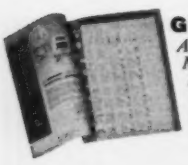

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camp of those U.S. companies that are "taking over Canada."

Higher tariffs on chemicals aren't likely until around '63, according to informed observers. Some adjustments will be made on specific items—provided for by Sections 10 and 273 of the Canadian customs laws—but the over-all changes will come as a result of the hearings on Tariff Reference 120, the upcoming review by the Canadian Tariff Board. This review is similar to the one now being made of the Canadian textile tariffs—but larger in scope.

With the long-term timetable set up for the tariff study, it's conceivable that a different party could be in power by the time the Minister of Finance gets the report. This isn't expected to make much difference. It was the Liberal party's Walter Harris and not the Conservative's Donald Fleming who originally called for the review. The Liberals, if in office in '63, would just be getting their baby back fuller grown.

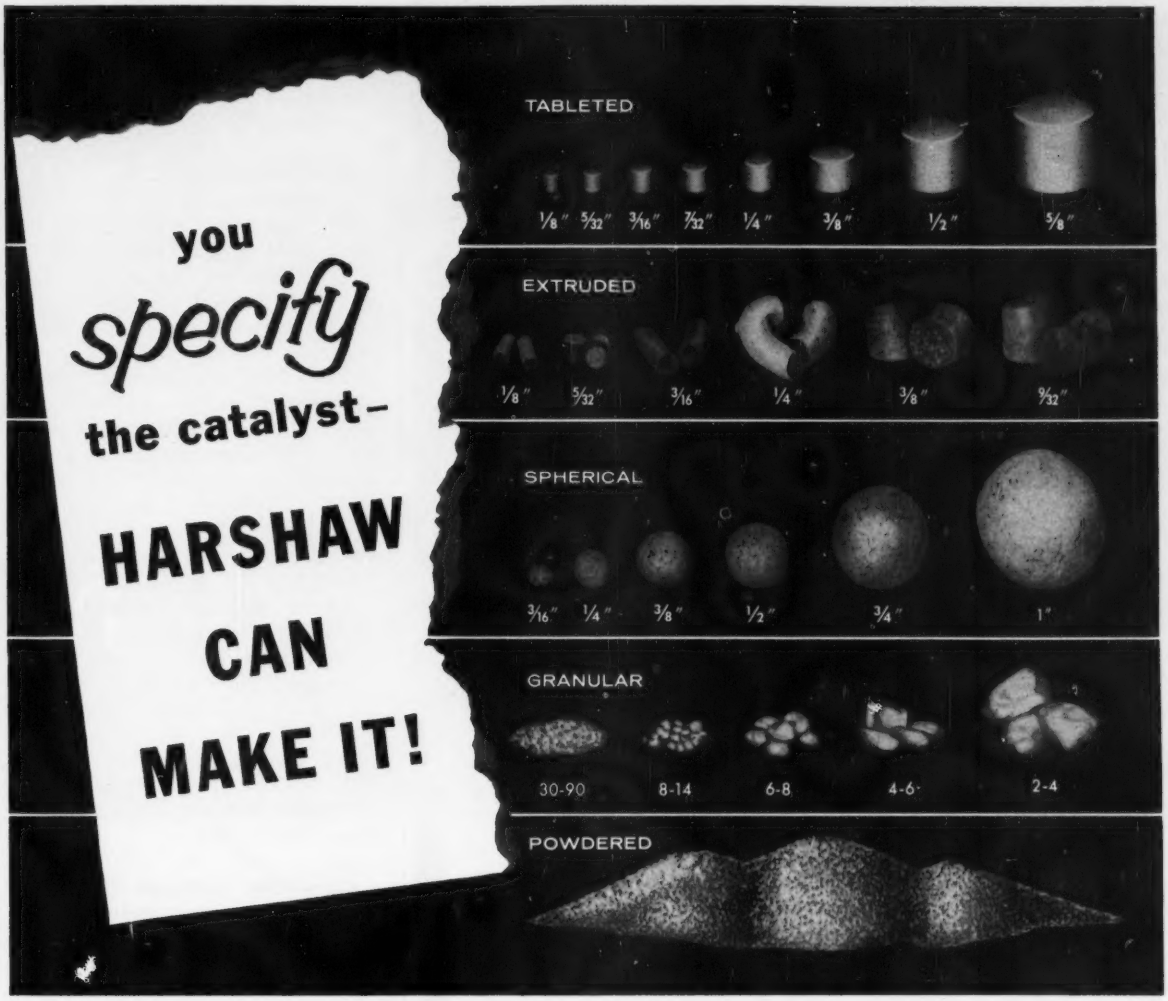
Barring a major shift in the mood of Canadian industry leaders, there are bound to be higher tariffs for chemicals. If makers of specialty chemicals, or suppliers to Canadian specialty makers, want to cash in on the market of 40 million Canadians expected by the year 2000, it's not too soon to be looking into the possibility of setting up a Canadian company—despite the difficulties.

PRODUCTS

Shingle Restorer: A method of renewing old shingles has been developed by Delka Research Corp. (1333 E. L. Grant Highway, Bronx, N.Y.). Old or worn asphalt shingles are coated with a polyurethane formulation, called Del-Coat, and sand is sifted over them while wet. The firm says that cost of processing asphalt shingles is 50-60¢/sq. ft.

•

Aerosol Valve: A. Schrader's Son (470 Vanderbilt Ave., Brooklyn, N.Y.) has developed an aerosol valve described as "the valve that only dispenses in the right direction"—accidental side pressure that might direct the spray at the user will not open this valve. Interior orifice at the point of the valve stem ranges from 0.010 to 0.030 in., the button orifice from 0.030 to 0.040. The valve has stem



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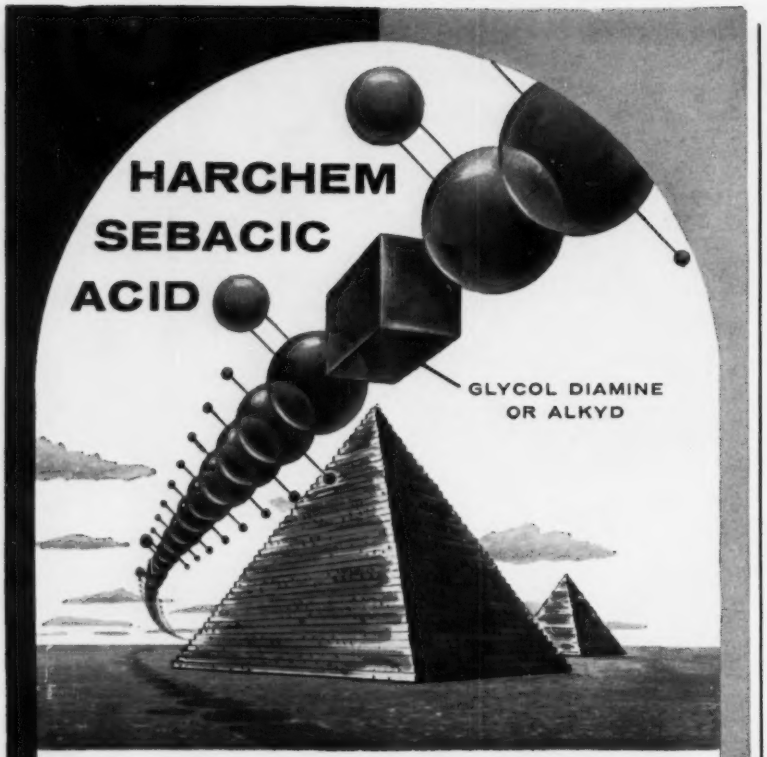

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Weed and Brush Killer: A weed and brush killer for control of deep-rooted weeds and woody plants is being marketed by Allied Chemical's General Chemical Division under the tradename Urab. It's said to be effective against scrub oak, wild hickory, poison sumac, trumpet vine, briars, cattails and Canada thistle. The active ingredient (3-phenyl-1, 1-dimethylurea trichloroacetate) is soluble in water. Formulations are either granular or liquid. The firm suggests using one-half cup of the liquid, or ¼-½ lbs. of the granular form, for 100 sq. ft. of area.

•

Aerosol Packaging: Kartridg-Pak Co. (9151 West Fullerton, Franklin Park, Ill.) will show its new semi-automatic aerosol packaging line at the packaging and machinery show in the New York Coliseum in November. Called KP-1000, the pressure filling unit is self-contained, and is said to be capable of filling 600 cans/hour. Price: $6,000-7,000.

•

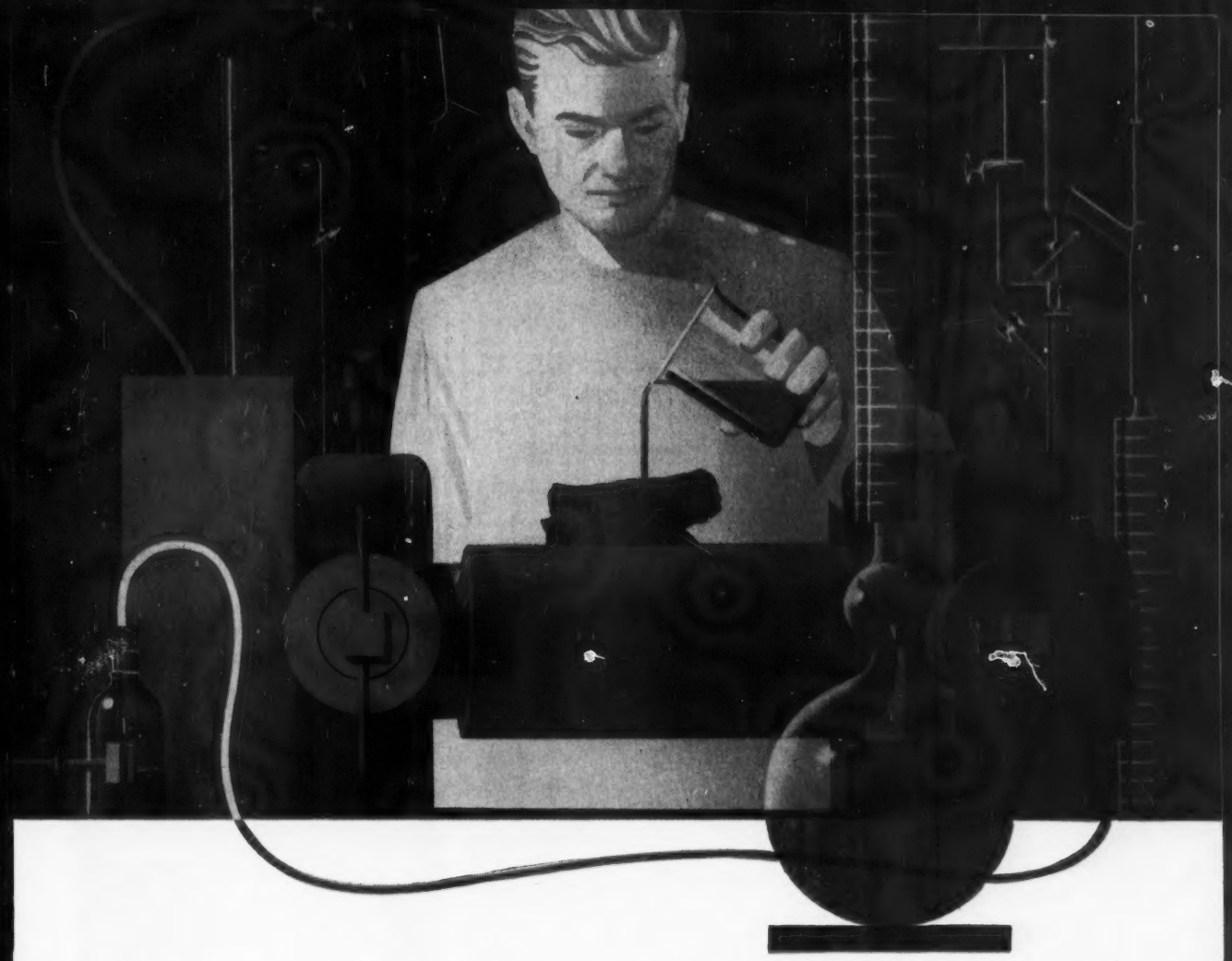
Glass Mold Lubricant: Delos M. Palmer & Associates, consulting engineers (Toledo, O.), has worked out a spray lubricant for lining glassware molds. Glas-Mol is a water-based colloidal suspension of microsized molybdenum disulfide, incorporating B. F. Goodrich Chemical Co.'s Carbopol 934.

•

Synthetic Resin Latex: The Chemical Division of Goodyear Tire & Rubber Co. (Akron, O.) has introduced a synthetic resin latex designed for use in upholstery backings, textile sizings, adhesives, textile printing inks, and carpet backing. Containing a nonstaining antioxidant system, Pliolite Latex 140 is a water dispersion of styrene-butadiene copolymer. It is said to form flexible films with high pigment binding and mechanical stability.

•

Antiradiation Rubber: Presray Corp. (Pawling, N.Y.) has developed a rubber compound for fabrication of pneumatic seals for nuclear reactors. The firm says Presray Compound No. 1704 does not crack, gum or deteriorate under intense radiation.



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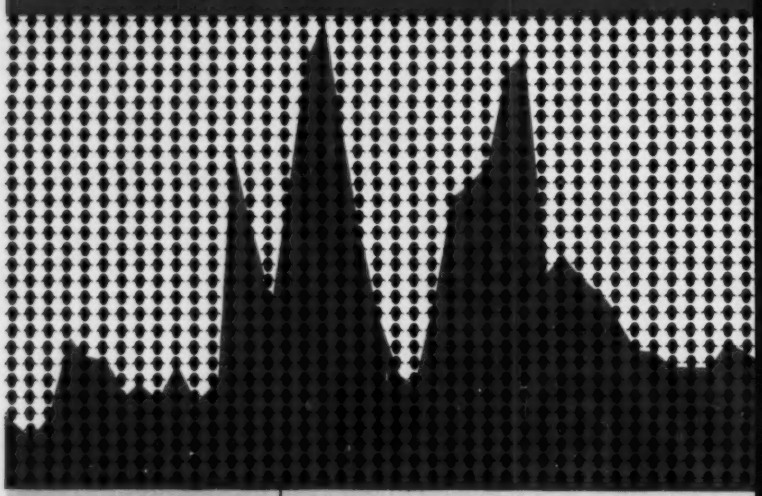

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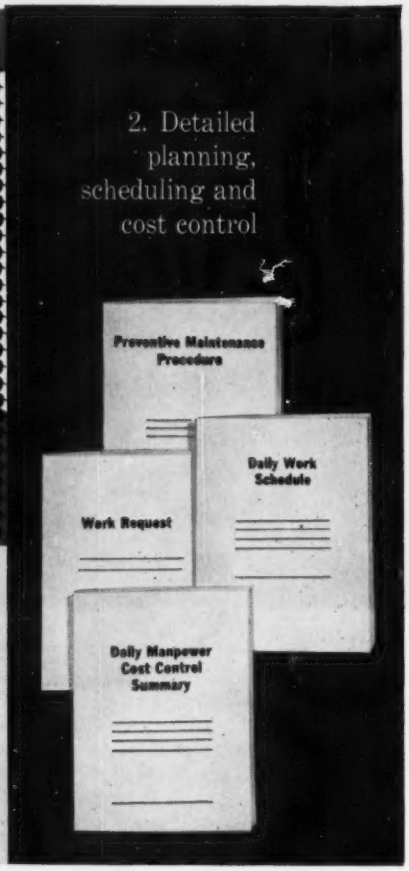

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TV Stars at Stockholders Meeting

A company stockholders meeting via closed-circuit television, replete with the panoply and suspense of a TV spectacular, was "attended" last week by nearly 2,400 stockholders of General Mills, Inc., in seven cities coast to coast. Prime value of the processing firm's novel move: reaching an unusually high 16.5% of stockholders* who listened to and watched management's informal report.

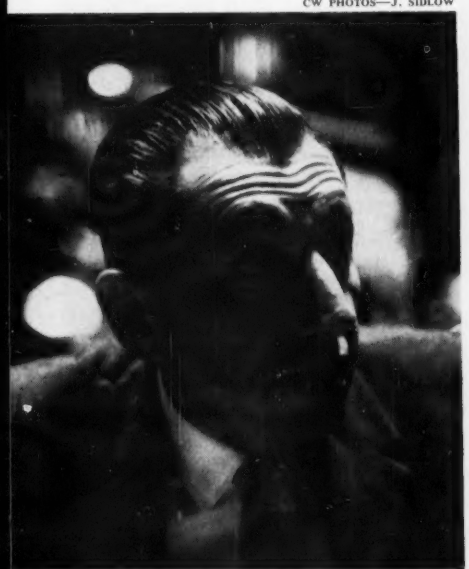
The network straddled the U.S. in nearly every direction except south. Late totals showed 400 viewers in Minneapolis (the company headquarters), 750 in New York, 300 in San Francisco, 200 in Los Angeles, 350 in Chicago, 250 in Buffalo, 125 in Boston.

Mechanics of the program involved setting up theater-size television screens, using giant projectors, in auditoriums in the seven cities, including the Starlight Roof of the Waldorf-Astoria in New York and General Mills' own auditorium in Minneapolis.

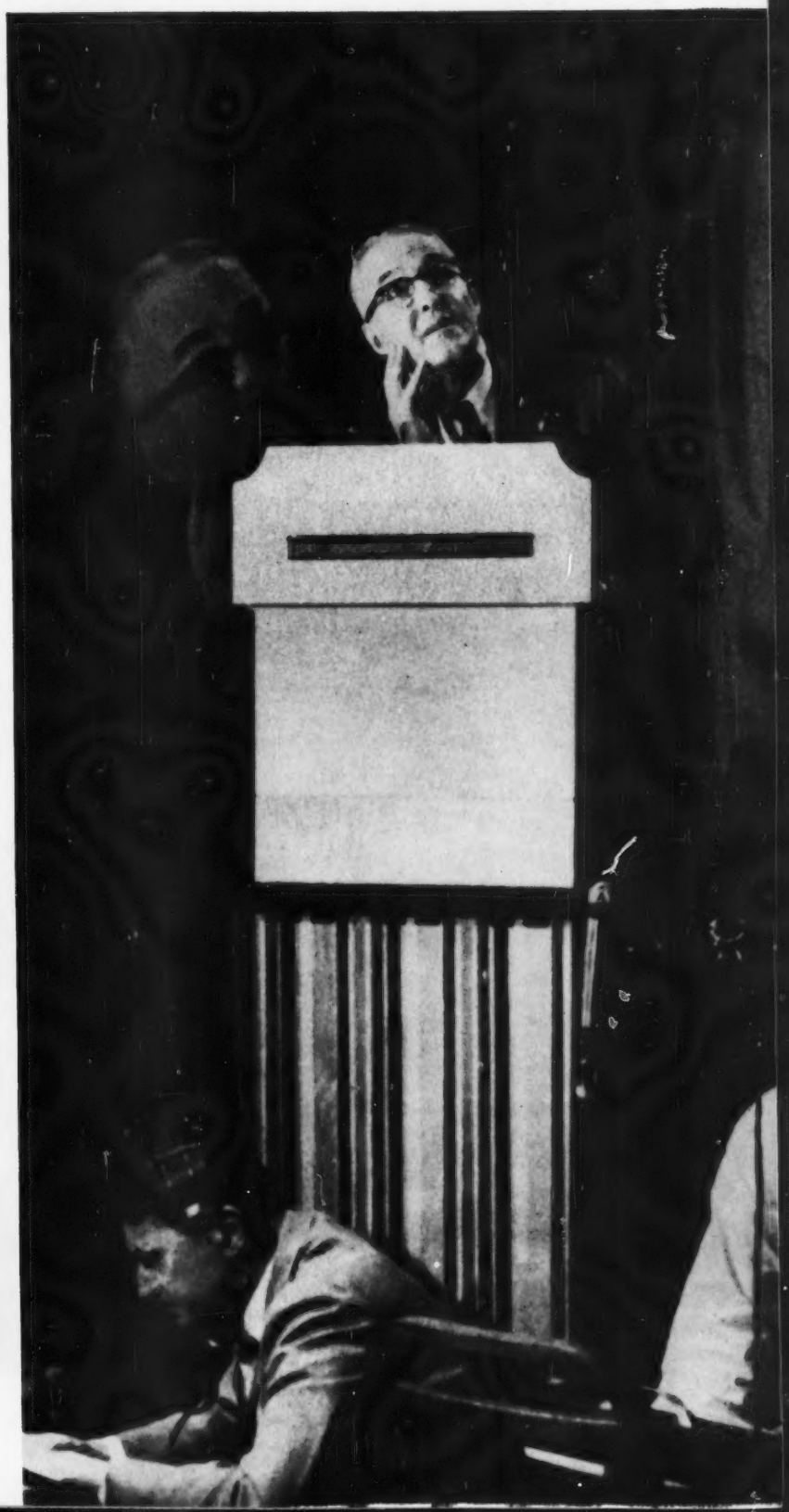
Although every city received the visual program, New York and Minneapolis were major video originating points; two-way audio served each location. In Minneapolis, President Charles Bell held the chair; in New York, Board Chairman Gerald Ken-

* American Telephone & Telegraph's annual meeting earlier this year, hailed as one of the largest ever conducted, attracted less than 1% —14,000 owners—out of 1.6 million.

CW PHOTOS—J. SIDLOW



'Critic' Gilbert top-rates show.



Mirrored on screen, Chairman Kennedy opens TV meeting.

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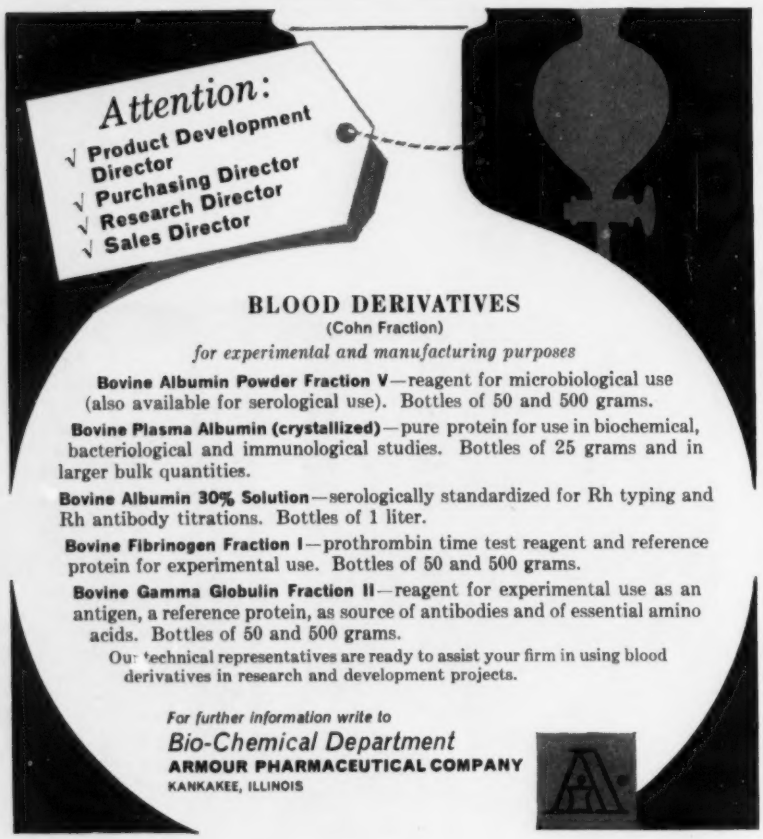

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nedy led the meeting. Other chairmen came in on audio with stockholders' questions. From Buffalo, via film, there was a presentation showing the operation of a completely automated packaging line.

The entire production was directed and produced by Theatre Network Television, Inc., and transmission was by microwave and over coaxial cables. TNT has handled other recent industrial "shows"—e.g., Ford Motor Co.'s two-hour presentation of its new Falcon line, and an IBM extravaganza depicting new computer equipment.

Background: General Mills is no neophyte at holding stockholder meetings in the grand manner. The company commenced its program of regional shareowner meetings — as follow-ups to its annual meetings — in 1939. Up to now, these have been traveling "road shows" for major cities; but time and wear on executives, the cost of moving the production from place to place and setting it up, strongly prompted the switch to use of TV. By early estimates, the program, costing about $75,000, saved the company approximately one-third the cost of the former type of regional meeting.

Planning this year's program began about six months ago. Auditorium facilities were then rented, specifications worked out with TNT, detailed script planning and "acts" arranged.

The production consisted of remarks by Kennedy and Bell, introduction of officers, a visual tour through the company's Betty Crocker Kitchens, a look at the Buffalo plant and a cartoon presentation of the annual report. At the end, there was time for questions from stockholders in each city—questions carefully planned to fit within the stringent time requirements.

After the show was off the air, the seven floors were opened for other questions—answered by the key people at the various cities.

Informal Meeting: The program was in no sense a formal one. State corporation laws, coupled with the problems of timing a leased-wire TV performance, render it nearly impossible to conduct a formal stockholders meeting, complete with voting and attendant discussions. The company's annual meeting was held in August in Minneapolis.

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purposes — an informal report to stockholders to follow up the year's business session—General Mills executives were well pleased with the results.

In general, stockholders were pleased also. Although a few questioned the size of the expenditure involved, most agreed it "was a fine thing." Lewis Gilbert, "professional stockholder" well-known for his persistent, knowledgeable demands for more information from company executives, termed the idea "the best money the company could spend for informing stockholders. Vocal communication means far more than the written word." Cost of reaching each viewing stockholder was about $30.

It's apparent, though, that there can be drawbacks. One is timing—a tightly written script, with carefully worked-in visual excursions, leaves little room for flexibility. Another is the possibility of a breakdown in the complex communications network. (The General Mills program was interrupted a few seconds by a communications breakdown from Buffalo.) Moreover, an overlong appearance of any one face or topic can start programs rustling and feet shuffling.

All in all, the technique seems to have much to commend it to other CPI concerns. The reaction of stockholders — including their turnout — is one indication that General Mills' experiment was a huge success.

Rush to Watersites

The rush to water is still on in the chemical process and other industries, according to latest reports from AWO—American Waterways Operators, Inc. Figures for third-quarter '59 show that although watersite building will undoubtedly be below last year's, relocation and expansion are still at a healthy level.

"This year, construction of barge facilities is at the highest nine-months' rate since AWO began the survey seven years ago," said its president, Braxton B. Carr.

The waterways that have had the greatest activity in new plant starts so far this year are: the Mississippi River, nine projects; the Ohio River, seven projects; and the Gulf Intracoastal Waterway and the Houston Ship Channel, three projects each.

CPI Involved: According to the as-

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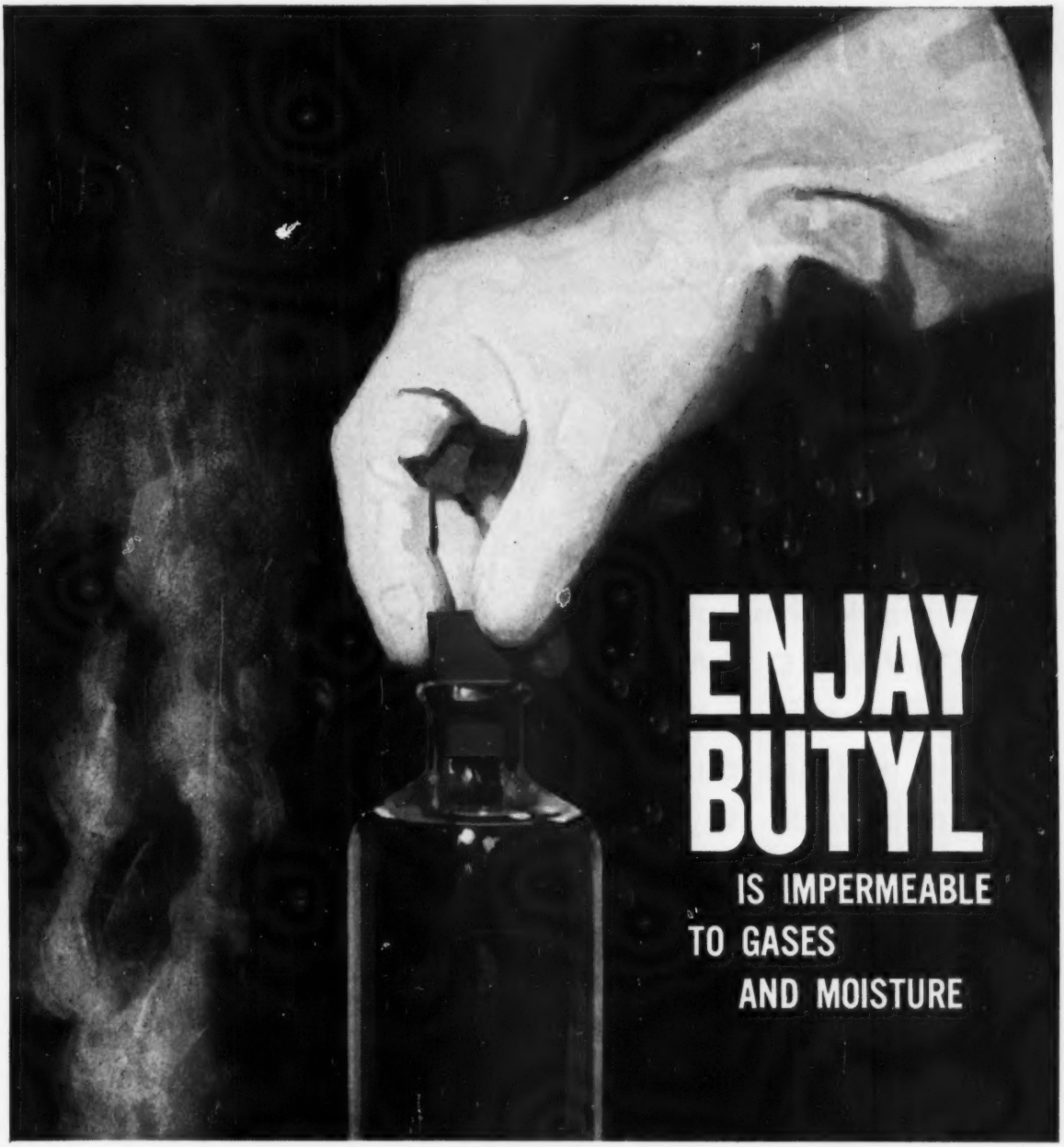

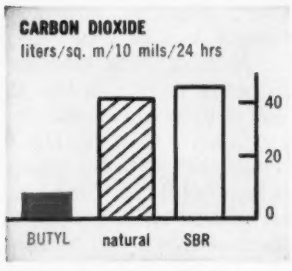

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ADMINISTRATION

sociation's breakdown, almost 20% of 58 waterside projects constructed or planned during third-quarter '59 are by CPI firms. Among those active in July through September:

- Air Products, Inc.—started production at its liquid hydrogen plant near West Palm Beach, Fla.
- Amoco Chemicals Corp.—plans a polystyrene plant on the Des Plaines River at Joliet, Ill.
- Armour & Co.—purchased Mississippi River Fuel Corp.'s nitrogen plant, and plans expansion of nitrogen product facilities.
- Du Pont—plans to construct a metallurgical research unit at Curtis Bay in Baltimore; a polyethylene resin plant on the Guadalupe River at Victoria, Tex.; and a polyethylene film plant at Richmond, Va., on the James River.
- Gulf Oil Corp.—started production at its new benzene producing unit at Port Arthur, Tex., on the Gulf Intracoastal Waterway.
- Monsanto Chemical Co.—acquired 700 acres for future expansion near Nitro, W. Va., on the Kanawha River.
- Pittsburgh Coke & Chemical Co.—is constructing a distribution terminal at Marietta, O., and plans a dock near Gravel Bank, O.
- Texas Butadiene & Chemical Corp.—plans to build a storage terminal at Houston, on the Houston Ship Channel.

LABOR

Independent Test: The battle between independent and national unions will get a major test in December, when employees of Esso Standard Oil at Baton Rouge, La., vote on whether to retain Independent Industrial Workers Assn. as bargaining agent or switch over to some other union. The National Labor Relations Board has ordered a vote on Dec. 2 and 3. Included on the ballot are Teamsters, IIWA, OCAW, Metal Trades Council, AFL-CIO, No Union. IIWA has represented three categories of workers at Esso, but hasn't had a contract in more than a year. A contract agreed on last May was never signed because of the move for a new election.

No Progress: Rapidly taking on the aspects of the "no-progress" steel

CHEMICALS OUTLOOK

November, 1959

This news bulletin about Wyandotte Chemicals services, products, and their applications, is published to help keep you posted. Perhaps you will want to route these and subsequent facts to interested members of your organization. Additional information and trial quantities of Wyandotte products are available upon request . . . may we serve you?

WYANDOTTE BOOSTS OXIDE PRODUCTS CAPACITY 50%

Latest development in Wyandotte's continuing expansion program is the completion of a 50% capacity increase at the oxide products plant in Wyandotte, Michigan.

The enlarged facility extends Wyandotte's ability to produce Pluronic* and Tetronic* polyols for their constantly broadening applications . . . also, polypropylene glycol and related products, which are proving particularly valuable in the preparation of polyurethane foams. The plant, now in its second year of operation, uses ethylene oxide and propylene oxide in the manufacture of these materials.

WYANDOTTE STEPS UP WATER SHIPMENTS

Wyandotte facilities are rapidly being geared to the increased trend toward water shipment of bulk chemicals . . . in the South, as well as in the North.

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With plants both on the Great Lakes and near the mouth of the Mississippi, Wyandotte is ideally situated to ship bulk chemicals by water . . . and offers extensive experience with barges, plus help in the design and construction of unloading and storage facilities. Wyandotte's dense soda ash has been shipped by boat from the Wyandotte (Michigan) plant for a number of years . . . pioneering a practice not yet common in the industry.

Barge shipments of ethylene glycol and caustic soda are going out regularly from Wyandotte's Geismar Works immediately south of Baton Rouge, Louisiana. And in August of this year a chlorine barge-loading line was completed there, activating a planned program of continuous water movement of chlorine.

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ADMINISTRATION

strike, the two refinery strikes against American Oil Co. at Texas City, Tex., and El Dorado, Ark., show no signs of approaching settlement.

At Texas City, the strike of about 1,250 members of Oil, Chemical & Atomic Workers Union just passed its 16th week, making it the longest Texas Gulf Coast refinery strike by OCAW. Supervisory personnel there, however, have brought Amoco operations up to about 75% of capacity.

At El Dorado, members of Local 8-434 recently voted to continue their strike against the refinery, after rejecting a company proposal. At issue are changes in work rules allowing the company more freedom to reassign workers.

KEY CHANGES

Walter A. Steiner to vice-president, technology, National Carbon Co., division of Union Carbide Corp. (New York).

John A. Lunn to board of directors, American Research and Development Corp. (Boston).

Lawrence S. Pricher to vice-president, New Jersey Zinc Co. (New York).

Robert T. Wallace to vice-president, Owens-Illinois International, S.A., Panamanian subsidiary of Owens-Illinois (Toledo).

Paul A. Krentel to manager, sales and marketing, Bzura Chemical Co. (Keyport, N.J.).

Charles V. Jones to treasurer, **Allan R. Bennett** to assistant treasurer, and **Robert W. Dammann** to secretary, Chemagro Corp. (Kansas City, Mo.).

Harry J. White to director and **Ralph L. Chamberlin** to secretary, Research-Cottrell, Inc. (Bound Brook, N.J.).

M. D. Ayers to director of engineering, Kennecott Copper Corp.

KUDOS

To **Jaroslav Heyrovsky,** professor of polarography, in Prague, Czechoslovakia, the 1959 Nobel Prize for Chemistry.

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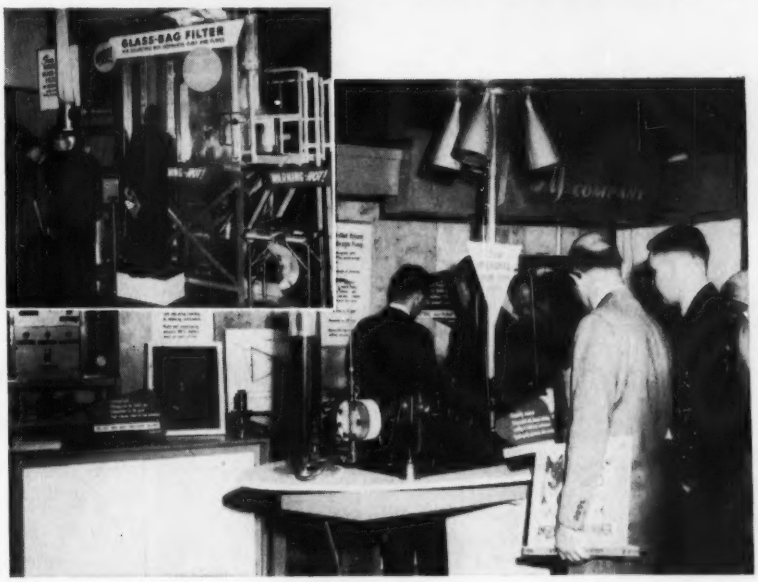

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Sonics Clean Dust Collector Bags Soundly

Comparison of dust-collecting methods (right) shows why Fuller Co.'s Dracco Division is ready to sound off about sound at the Chemshow in New York Nov. 30-Dec. 4. Sound waves, says Dracco, may help solve the big problem of cleaning bag-type dust collectors used in high-temperature applications. Sonic cleaning's big plus: it shakes the dust out thoroughly, yet so gently even glass-fiber bags last through many extra cycles.

Until now, Fuller, which is researching the sonic-cleaning technique at its Catasauqua, Pa., headquarters, and Dracco, which is marketing the collecting system through its Cleveland base, have talked softly about the use of sound. And, they've talked not at all of their first two jointly engineered glass bag installations — at Dragon Cement Co.'s Northampton, Pa., plant and at Allentown Portland Cement Co.'s Evansville, Pa., plant.

"We've been researching sonic cleaning for only about a year and a half, and we have had a lot to learn about it," is the way Roland Lincoln, who heads up Fuller's research on the project, explains the companies' semi-secrecy.

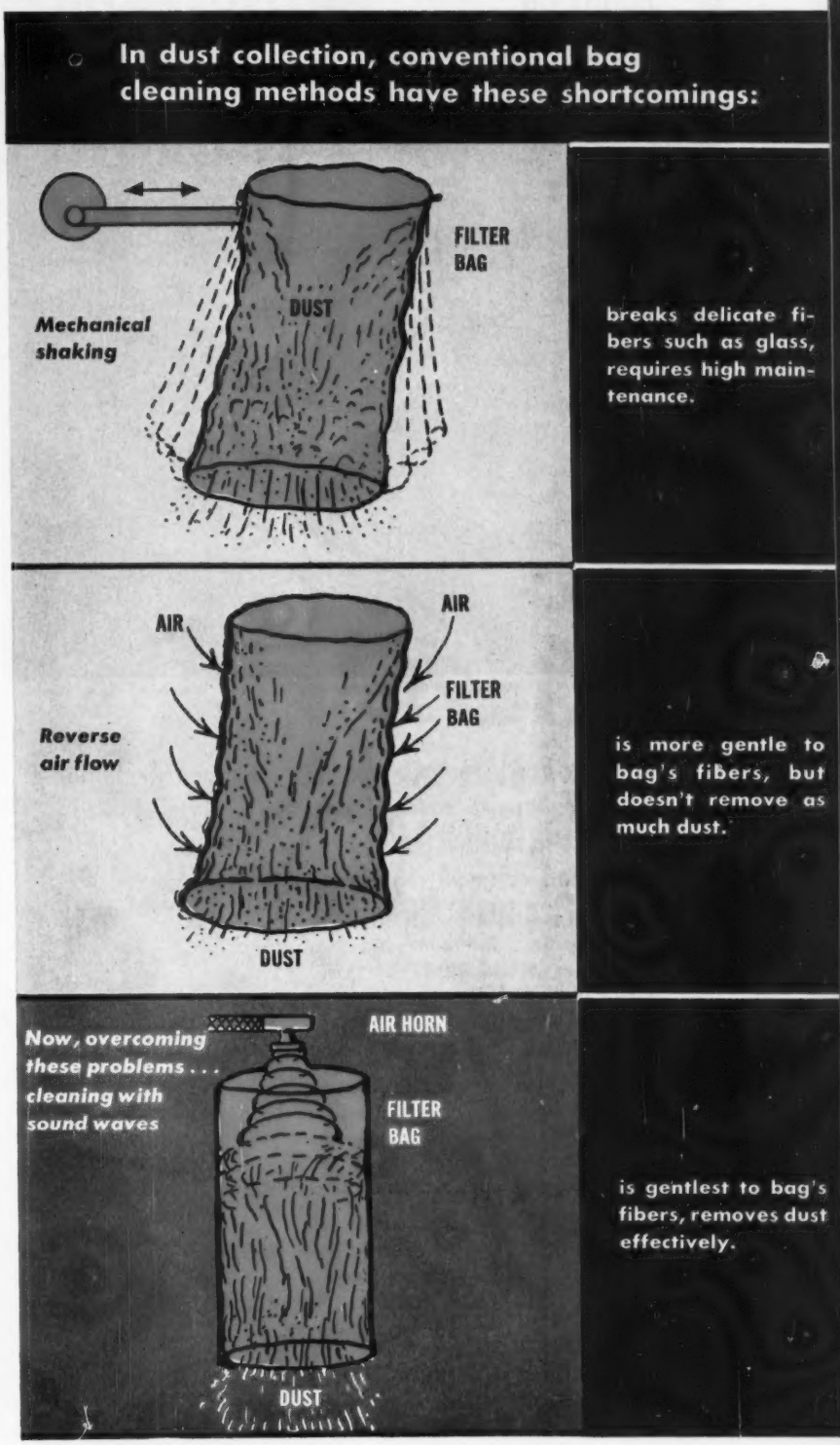
"We've had units in field operation for only about a year. We've wanted the trials to prove out. We didn't want to be flooded with queries we couldn't answer," adds George Schneider, Dracco's vice-president of engineering.

Dracco and Fuller are still talking with caution. But now that they have lengthy, successful operating time at Dragon and Allentown under their belt, they are ready to disclose just how well sonic cleaning works.

Too Simple: Called Sonoclean, the technique uses sonic generators having a low, audible frequency (they sound like a fog horn or railroad whistle) that causes the filter bags to vibrate, shake off dust.

Fuller has licensed the basic patent (U. S. 2,769,506), which covers any audible sound working on a filter medium, from inventor Harry Abboud. Abboud of Ville Platte, La., and Joe Izen of Houston applied for the patent in '52; it was granted in '56.

The company has since applied for


In dust collection, conventional bag cleaning methods have these shortcomings:
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DUST
breaks delicate fibers such as glass, requires high maintenance.
Reverse air flow
AIR
AIR
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DUST
is more gentle to bag's fibers, but doesn't remove as much dust.
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is gentlest to bag's fibers, removes dust effectively.

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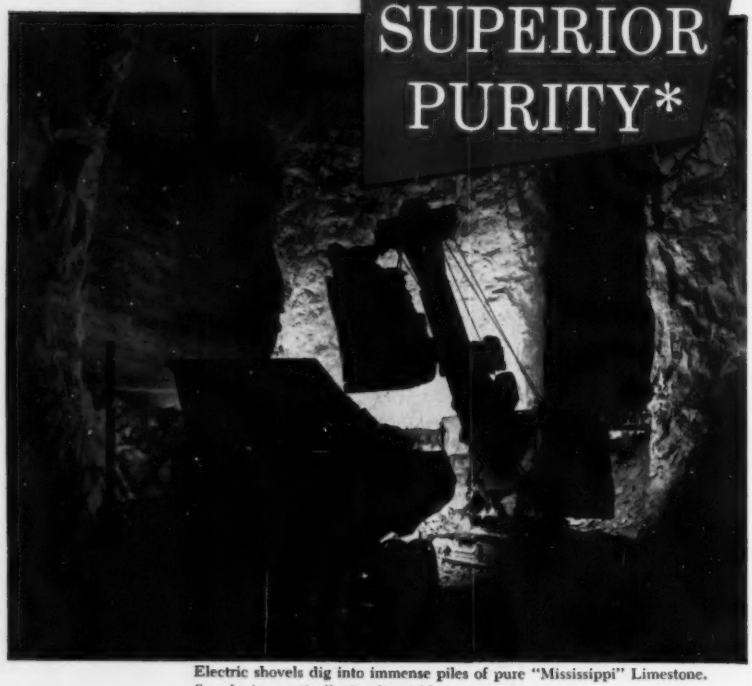

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additional patents based on its own research.

Lincoln, who along with many others researched agglomeration of dust particles by ultrasonics (a method that failed to live up to its promise), admits that he was cool to the idea of sonic cleaning at first. "But the coolness lasted only until we tried it out in the lab," he says.

One horn normally cleans 2,500-3,000 sq.ft. of cloth, according to Schneider. But Fuller is still conducting research, may find techniques that will improve the cleaning power.

Vibration of the cloth isn't visible, but can be felt by touching the cloth. Noise hasn't presented problems so far. While a worker wouldn't want to stay in the bag house very long, the noise isn't objectionable outside the bag house; sometimes it's difficult to hear over other plant noises, according to Lincoln. However, present installations are in closed-type bag houses (i.e., discharge is to a tall stack). Installation in an open-type bag house (i.e., discharge of cleaned air directly to the atmosphere) hasn't been tried yet.

Less Wear: Sonic cleaning has immediate application in glass bag collecting systems where vigorous mechanical shaking will break the glass fibers. Most glass bag systems now in use reverse the flow of air through the bag to clean without breaking the fibers. But reversing the air flow doesn't clean as effectively as shaking.

For example, a typical reverse-air installation may operate with a pressure drop of about 4 in. of water across the bags. "With sonic cleaning, we can cut the pressure drop by one-quarter to one-half," says Lincoln.

Lower pressure drop means fan power savings, could lead to units with higher capacity or smaller size. Most collector makers design for air flows in the neighborhood of 2 cfm./sq. ft. of filter cloth. But if pressure drop can be kept down, Fuller may be able to increase the air-flow-to-cloth ratio.

Shaker Proponents: Mechanical shaking can be used for glass bag installations if the shaking action is gentle. For example, L. A. Andrus of Wheelabrator Corp. says that a glass bag will last one to two years if cleaned by gentle shaking.

But to some firms, the hazard of fiber breakage is too great. That's

why Ed Salk of W. W. Sly Mfg. Co., says his company uses only reverse air for cleaning glass.

Dracco recommends a gentle mechanical shake for some glass bag installations (e.g., where the dust is fluffy, isn't easily removed). Where sonic cleaning is appropriate, it has several advantages over a gentle mechanical shake. For example, any mechanical shaking of glass bags should be done as infrequently as possible to help reduce wear. But if cleaning is infrequent, pressure drop and power usage increase. And, since sonic cleaning cuts bag wear, cleaning can be frequent. At the two cement installations, the bags are cleaned every 35 minutes.

Mechanical shakers are more costly to maintain, tend to shake themselves to pieces. And, the installation cost is often slightly higher than for reverse-air systems. Sonic-cleaning costs fall between those of reverse-air and mechanical-shaking systems.

On the basis of maintenance and installation costs, sonic cleaning may compete with mechanical shaking in collectors using cotton or other types of bags that withstand vigorous shaking. Lincoln says that one Sonoclean installation is under trial using cotton bags, and cleaning efficiency is high.

High Efficiency: Bag-type dust collectors have always been a highly efficient gas-stream cleaning device. But their use has been limited by the filter media used and lack of effective methods of bag cleaning.

Cotton is the cheapest filter medium, but can't be used at temperatures much higher than 180 F. Some of the synthetic fabrics and special weaves improve cloth cleaning (e.g., monofilament fibers are more easily cleaned), permit use of bags for higher temperature operation. Dacron and felt are used for temperatures of about 250 F, Orlon for about 275 F.

Glass cloth, which, like the synthetics, is about four times as costly as cotton, extends the temperature range of bag-type collectors to about 600 F (e.g., Dragon and Allentown are operating with bag temperatures of about 550 F). But glass cloth found only limited usage at first because it was attacked by mild alkalis and acids. "Silicone coatings generally have licked the problem, although alkalis are wetting agents and will tend to 'wick' some moisture into

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- Chloracetopyrocatechol
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- Diethylacetamidomalonate
- Diphenylacetonitrile
- Ethylacetamidocyanoacetate
- Gramine
- Indole-3-Acetic Acid
- m-Hydroxypropiophenone
- Malononitrile
- 2-Mercaptothiazoline
- 3-Methylthiophene
- Phenylcarbethoxypyrazolone
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the fabric," says Larry Nelson of W. W. Criswell Co., a large glass bag supplier. Wheelabrator's Andrus agrees, says that without silicone coating, glass bags have an average life of about six weeks; with the coatings, they'll last one to two years. Nelson says some bags will last three years.

The silicone coatings also are of some help in cleaning. But most collector makers agree that improved cleaning is only secondary.

The most effective cleaning methods are still mechanical. "The big problem with all of them is that they employ some type of gimmick that requires mechanical maintenance," says Criswell's Nelson.

"We're always looking for ways to simplify the cleaning, cut down on mechanical maintenance," says Lincoln. "We don't say we have the final answer in sonic cleaning, but we've taken a long step forward in bag collector cleaning methods."

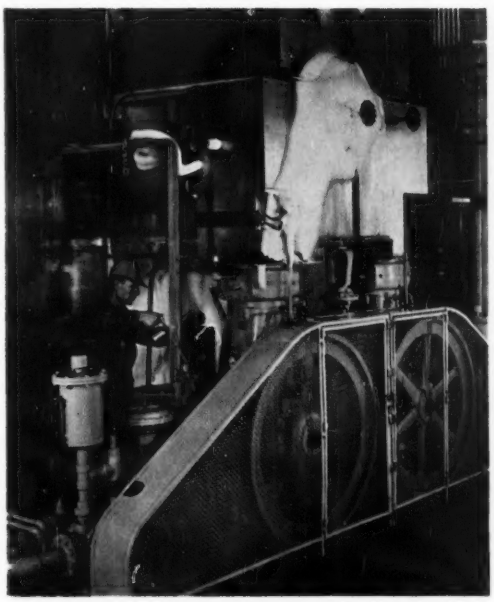
Fuller's chairman of the board, Alfred E. Douglass, says that for each installation dollar spent, a Sonoclean glass bag filter system is more efficient than electrostatic precipitators.

Cost comparisons are difficult to get because conditions vary considerably with the type of installation, type of dust, etc. But, as an engineer at one company points out, a bag house usually has a 99.9% efficiency. "It's easy to install an electrostatic precipitator at an equivalent cost, but efficiency will generally be lower unless you want to spend a lot more for the electrostatic," he says.

Ralph Chamberlin, Research-Cottrell's director of engineering, concedes that in some instances bag collectors have higher efficiency although priced lower. But, he points out, economical use of electrostatic precipitator or bag collector depends on the conditions. For example, at low temperatures, a gas with high moisture often causes the bag collector to plug. And, at high temperatures, bag collectors can't be used. Also, the electrostatic has the advantage of low pressure drop, which means power savings.

Chamberlin's points are valid. But the use of glass bags has already extended the temperature range of the bag collector. And, sonic cleaning is helping to improve bag cleaning efficiency, to cut pressure drop. It could pay off in big savings in the future.

EXPANSION ENGINES TO PRODUCE LIQUID HELIUM AT MINUS 452 F



↑ Vertical single cylinder expansion engines on helium separation service. Hydraulic power absorption system permits quick and accurate response to flow changes.

To build a machine to operate at temperatures just 7.4 degrees above absolute zero requires skill and experience. Temperatures below—400 F are not new to Worthington. Worthington has already engineered expansion engines to operate at—422 F. Worthington has completed extensive engineering work to meet the operational problems encountered at the liquefaction temperature of helium.

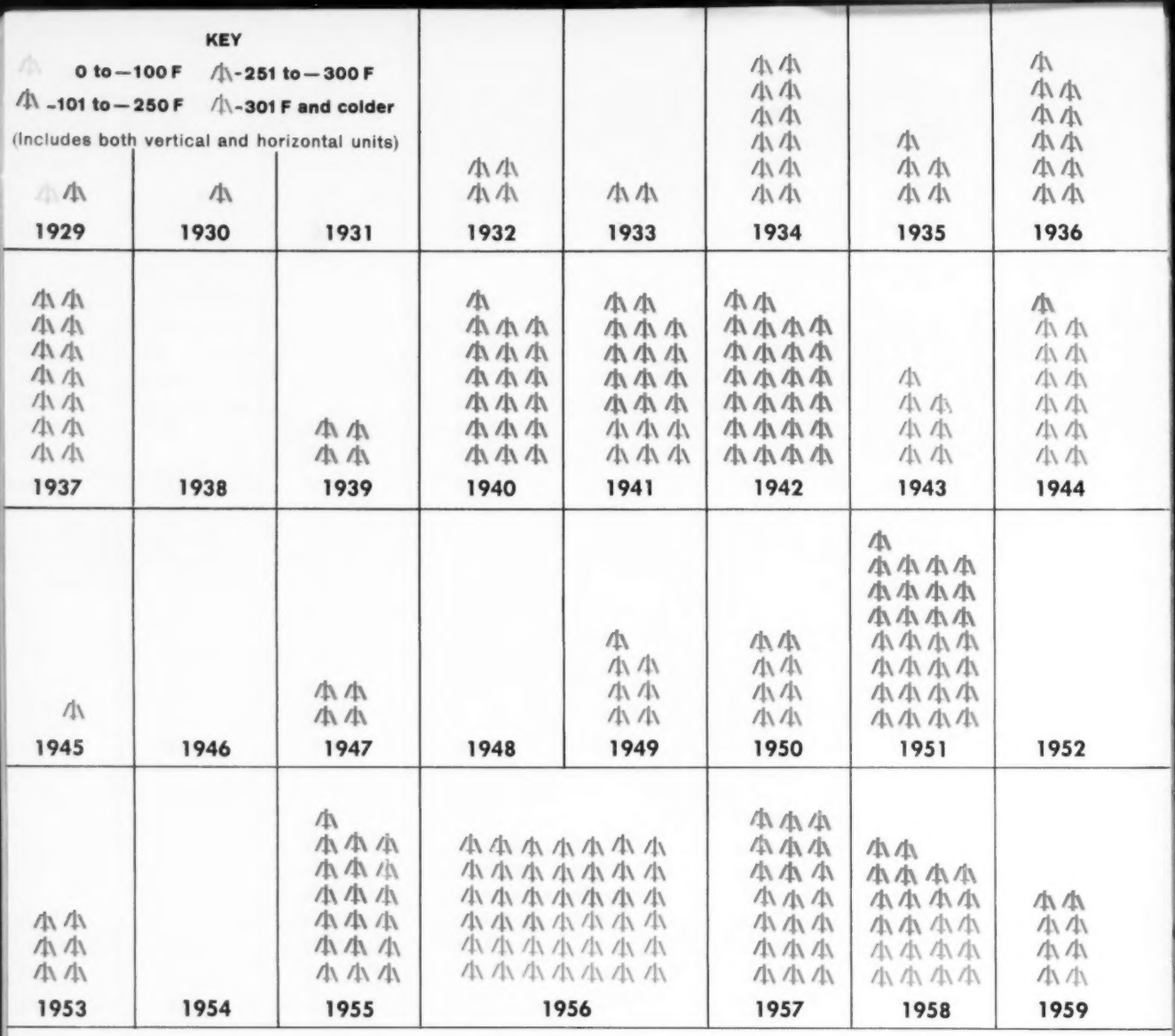
As a natural result of this low temperature work, Worthington now offers reciprocating expansion engines for the demanding job of helium liquefaction. For a documentation of Worthington's experience in the expander field, please turn the page.

WORTHINGTON

Typical applications for Worthington expanders

GAS	LIQUEFACTION TEMPERATURE (Atmospheric Pressure)		
	Fahrenheit	Centigrade	Kelvin
METHANE	−258.5	−161.4	111.7
OXYGEN	−297.4	−183.0	90.1
AIR	−317.6	−194.2	78.9
NITROGEN	−320.4	−195.8	77.3
HYDROGEN	−422.9	−252.7	20.4
HELIUM	−452.0	−268.9	4.2

↓ Horizontal single cylinder expansion engine on air separation service. Powerful frame and tough, yet precision valve mechanisms assure high engine reliability.



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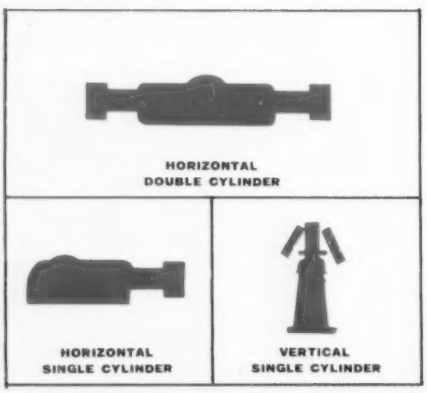

3 basic designs to choose from

The illustration above pictures Worthington's broad range of experience in the low-temperature reciprocating expander field. (Supplementing this is Worthington's long experience in high and low-temperature turbine expanders.)

An expansion engine is not just a reverse compressor. It must have a powerful frame to handle pressures of several thousand lbs. per sq. in. The valve gear also requires special consideration. Several years ago Worthington developed a patented valve gear with remarkable durability. Operating under loads which sometimes exceed several tons, valve gear failures are almost non-existent.

Many expander applications call for non-lubricated construction. Worthington has successfully built many such units. Worthington also makes all types of units, in both horizontal and vertical designs, to handle every expander application.

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WORTHINGTON

Market Newsletter

CHEMICAL WEEK
November 14, 1959

Kaiser Steel has begun shipments of coal chemicals, now that it has restarted coke operations, following settlement of the recent strike. Chemicals again available include benzol, toluol, xylol, crude phenol and ammonium sulfate. However, Kaiser's stepped up coal-chemicals production won't alleviate the nation's acute shortage of naphthalene.

Reason for fast return to chemical production and shipment, according to Kaiser spokesmen, is that coke operations were never shut down completely; the firm has an agreement with the union permitting operation of coke ovens on a reduced basis—just enough to prevent damage to them.

Meanwhile, benzene is almost as hard to find as naphthalene. There's unconfirmed trade talk, for example, that one major benzene buyer is offering to pay 50% more than the going price, and it's known that Gulf Coast benzene marketers are getting premium prices—one reports that it's now selling for 40¢/gal. That's substantially more than the contract price of 31¢/gal., but still shy of the reported 46¢ offerings which, incidentally, some observers discount because they "can't understand how any buyer could afford to pay that much."

•

Competition emerges in the West Coast acrylic latex business. Reichhold Chemicals recently went on record as the Coast's first producer of acrylic emulsions (*CW Market Newsletter, Nov. 7*); now Borden reveals it has been making acrylic latex "off and on"—six batches in all—during the past four months, and plans to produce "as much as we can sell."

•

Meanwhile Reichhold's Eastern expansions are plagued by effects of the prolonged steel strike. Startup date of the firm's new phthalic anhydride plant at Elizabeth, N.J., remains uncertain, but could come in December. Capacity of the plant, a spokesman insists, is officially rated at 30 million lbs./year—despite some trade speculation that it will actually be able to make closer to 40 million lbs./year.

Completion of Reichhold's new maleic anhydride plant—also at Elizabeth—will likely be delayed because of the strike; tentative startup had been scheduled for mid-'60; but it now looks unlikely that lost time can be regained, and third-quarter completion is more likely.

Incidentally, Reichhold's choice of location for a new phenolic molding resin plant isn't yet firm. A decision, however, will probably be made within the next few weeks. Could the site be Newark, Ohio, where RCI has picked up a 70-acre industrial tract? Only comment from the company: the location is a "logical" choice for any further expansion, since land at the Detroit plant is used up. But, says Reichhold, this doesn't necessarily imply the phenolics unit will go up there.

Boost of copper sulfate prices last week was a switch, since producers not tied up by the copper strike were assuring customers that copper chemical tabs would remain firm *(CW, Oct. 24, p. 87)*. The switch, nevertheless, doesn't come as a complete surprise, and further supports *CW*'s earlier view that a late-'59 copper chemicals scramble was in the making.

The backtrack on earlier plans to hold the price line is explained by a Republic Chemical spokesman this way: RC is "forced" to initiate the price boost on 99% crystalline copper sulfate (up 40¢/cwt., to $12.75/-cwt.) because of increased cost of primary metal. Although RC's sulfate output is only partially tied to use of primary metal, it's explained that copper chemical prices are "traditionally geared to primary copper prices."

Impact of the copper sulfate price boost—which likely will soon broaden to include other sellers, and other copper compounds—isn't as great as first appears. Republic says contract customers (bulk of the firm's business) will get sulfate at previously agreed prices; the hike will hit spot buyers.

•

The U.S. aluminum industry is cutting back heavily on output of primary metal. The reason: slashed demands by metal fabricating industries suffering from impact of the steel strike.

Reynolds Metals last week reduced primary output to 80% of capacity; and this week Kaiser Aluminum & Chemical is taking off a potline, cutting production 10%. Aluminum Co. of America says no production shaving is planned—presumably because the firm has been operating at only 82% capacity for some time.

Aluminum makers' optimistic hopes for '59 and '60 records are pretty well quashed. There's little likelihood that domestic demand will reach the expected 2.2 million tons in '59, and few producers expect that the predicted 2.4-million-tons demand in '60 will be realized.

•

Directives for Hungary's second five-year plan (1961-65) call for doubling of the nation's chemical industry by '65, compared with that of '58. Pushed especially fast is the plastics industry. Some specific projects to be completed—or well under way—by '65: 10,000-metric-tons/year polyethylene plant, two polyvinyl chloride units (capacities of 6,000 and 10,000 metric tons/year), a 3,500-tons/year synthetic fiber plant.

SELECTED PRICE CHANGES—WEEK ENDING NOVEMBER 9, 1959

	Change	New Price
UP		
Copper sulfate, cryst., 99%, c.l., wks., cwt.	$0.40	$12.75
Copper sulfate, monohydrate, 35%, c.l., cwt.	0.90	23.10
Copper carbonate, 55%, c.l., cwt.	1.45	36.35
DOWN		
N-methylaniline, tech., tanks, frt. alld.	$0.08	$ 0.60

All prices per pound unless quantity is quoted.

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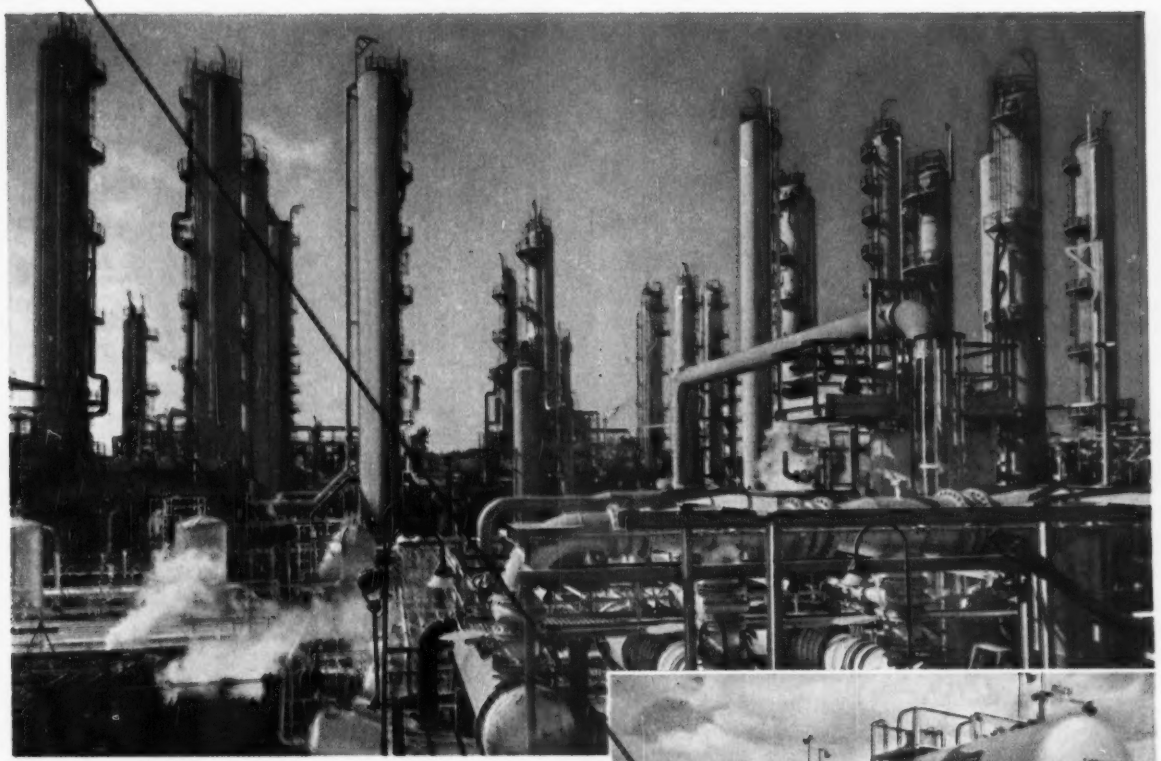

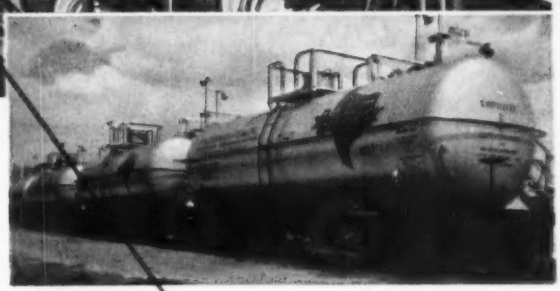

Anticipating increased interest in copolymers of n-BUTENE-1 and other olefins, Petro-tex came on stream with 95% minimum n-BUTENE-1 a year ago. Now, this high-purity alpha olefin is being used by important producers of linear olefinic polymers to improve resistance to stress cracking and to reduce low-temperature brittleness.

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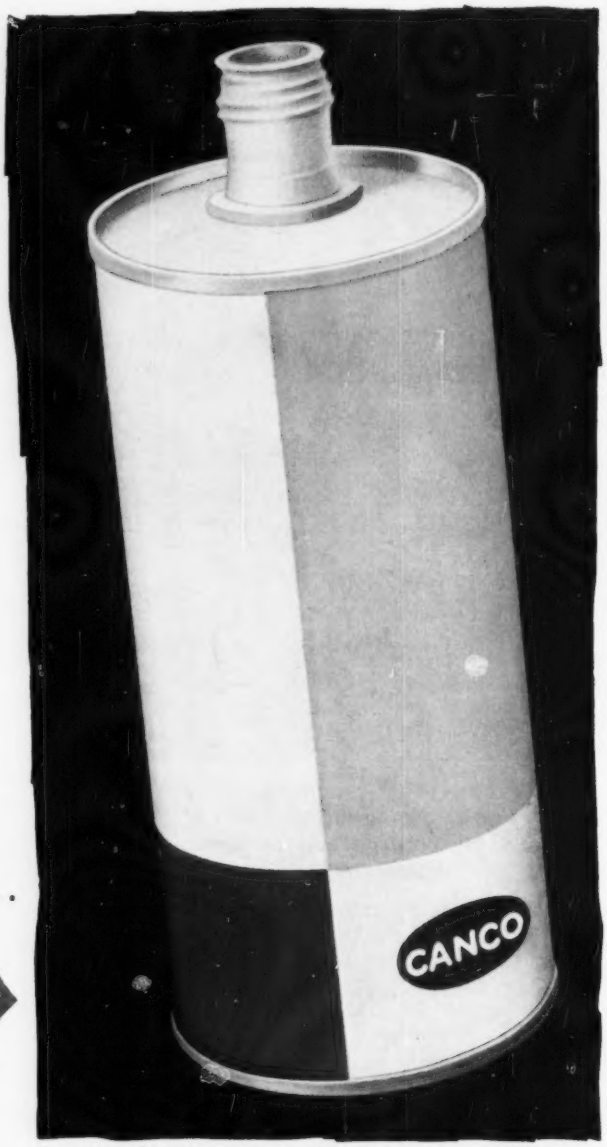

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AMERICAN CAN COMPANY

How New Products Strengthen CPI's Sales

New data available this week helps answer a perennial marketing question: Where do new-product ideas come from? One surprising revelation: among chemical process firms, although research and development staffers are still the best source of new-product ideas, sales-force members rank a close second.

The new information comes from a breakdown of the product planning practices of 55 CPI companies culled from American Management Assn.'s survey of 252 U.S. companies (134 industrial firms, 118 concerns selling to the public and to industrial and military consumers).

The new study also turned up several distinct differences between chemical processors and business and industrial firms in general: CPI companies expect more from new products, put more stock in developing specially tailored products aimed at certain market segments, and are more intent on developing lower-cost products.

Idea Sources: Chemical processors also are different from other industrial companies in that the sales staff is the second-ranking (64% of respondents noted it) idea source. Among the 134 industrial firms (including CPI), the sales groups provided the lion's share of ideas (73% of firms said so), a position held by the CPI's research and development staffs (*See table*).

Other important idea-generators among the CPI companies include customers (named by 27% of respondents), market research departments (24%), and analyses of competitors' successes and failures (13%). It appears that CPI firms benefit considerably more from "new-product intelligence" gathered by market research activities than do other firms polled.

On the other side of the coin, some of the least useful idea sources, according to CPI companies, are accounting department records of adjustments, sales returns and allowances (listed as least useful by 71% of CPI firms), service department records of repairs (46%), government agencies (42%), distributors and other middlemen (36%), and the companies' own employees (18%). But there were sharp exceptions to every generality: some of the prime idea sources (R&D staffs, sales, market research) also were named by some companies (20%) as the poorest idea producers.

Supply and Demand: Survey results underline the dynamic technology that characterizes chemical process industries' operations. Less than one-third (29%) of the CPI companies stated they had "about the right number" of new-product ideas

How CPI Management Regards New-Product Ideas

	CPI Companies (55)	*Industrial Companies (134)*	*All Companies (252)*[1]
	(per cent of companies polled)		
1. WHERE THEY COME FROM[3]**:**			
Research and development	75	54	57
Sales force	64	73	62
Customer suggestions	27	32	23
Market research	24	16	18
Competitor's experiences	13	12	14
2. HOW THEY'RE USED[3]**:**			
For specific markets	35	17	25
Products based on new materials	33	21	23
"Complete the line"	29	28	34
New items to build identity	29	21	37
3. WHAT THEY SHOULD PROVIDE[3]**:**			
Greater profits	53	39	60
Industry leadership	33	22	38
Product emphasis	38	36	60
Broader product line	31	33	56
4. HOW THEY'RE COORDINATED[3]**:**			
General management	29	41	33
Product manager	22	22	16
Marketing or sales	18	11	34
Research and engineering	15	10	7
Committees	16	16	10
5. THE SUPPLY[3]**:**			
Too many	31	34	29
About right	29	42	45
Too few (2)	30	19	23
No answer	10	5	3

(1) AMA survey of 252 companies included firms serving the consumer and military markets as well as industrial concerns. (2) Includes 10% of respondents who stated they received many new-product ideas, but too few good ones. (3) Percentage of respondents totals more than 100%, since most firms checked several classifications.

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Property Data	
Molecular Weight	64.06
Specific Gravity	
Liquid.....Water=1@0°C (32°F)	1.434
Gas.....Air=1@0°C & 760 mm	2.2636
Melting Point..(−103.9°F)	−75.5°C
Boiling Point..(14°F)	−10.0°C
Refractive Index	
Liquid....(I.C.T. 1, 107)....n20°/D (68°F)	1.410
Gas (Mellor, J.W. Vol. X, 197) n15°/D (59°F)	1.000686

ANSUL CHEMICAL COMPANY • MARINETTE, WISCONSIN

to work with. In contrast, over 42% of the industrial companies were content with their list of new ideas (*see table, p. 111*).

Although nearly one-third (31%) of the CPI firms reported having too many new-product ideas, as many (again 30% of respondents) voiced their experiences this way: "We get loads of ideas, but far too few really good ones."

Specially Tailored Products: Of all the new-product "goals" named by the CPI firms, most significant is the marked emphasis on products specially tailored to penetrate specific segments of the market. More than twice as many CPI firms as general industrial companies (35% vs. 17%) named this as a goal in their new-product thinking. Other important goals: the use of new materials (33%), "completing the line" (29%), new features to build product "identity" (29%), and lower-cost products (24%).

The most popular "write-in" answer to the question of product-planning goals was that of aiming for a unique marketing position—and, concomitantly, an excellent profit potential—by means of a strong patent position.

Product Policies: Over one-half (53%) of the CPI companies stated they had a formal policy on the profits they expected from potential products, while only 39% of the industrial firms queried had such a policy. And CPI firms appear to be more concerned about achieving a degree of industry leadership than do other industrial companies.

In other aspects of product policy (such as product "mix," scope of product line), CPI companies showed a marked similarity to other industrial firms in the survey.

Ways to coordinate new-product planning—managing the myriad of activities between formulation of a new idea and the startup of full-scale production facilities—varied widely from company to company in the CPI. Compared with all the industrial companies in the survey, CPI firms gave more authority to their R&D staffs (15% vs. 10%), marketing departments (18% vs. 11%), less to general management (29% vs. 41%). But the prevalence of product managers and committees (for new-product coordination) appears to be about the same in the CPI as in other industrial companies in AMA's survey.

Where should the product planning activity report in the corporate structure? Less than one-half (49%) of the CPI firms said the report should be to general management; 44%, to marketing or sales. In contrast, 56% of the industrial companies stated they believed product planning should report to general management; but only one-third (36%) felt that marketing-sales should control this function.

The survey indicates that, regardless of sources of new-product ideas, the variety of policies and methods of coordination, and the goals involved, CPI management is well aware of the need to develop new ideas as the source of the profitable products of the future.

Beating Meeting Tie-up

A Connecticut chemical process concern last week did something about the long-winded sales meeting, and its technique holds tips for more than just sales management.

Rogers Corp. (Rogers, Conn.) set what appears to be a new sales meeting pattern by packing its session into one eight-hour day, streamlining events to provide for maximum attention on the part of participants—and by holding the meeting next door to an airport.

Travel Time Cut: Most unusual feature of the Rogers meeting was its locale. To cut travel time between the Hartford airport and the firm's headquarters, meeting facilities were rented at a motel adjacent to the field. The nine sales engineers—including those from Chicago, Detroit, Cleveland and Philadelphia districts—were able to fly in in the morning, walk the few steps to the nearby motel, convene, fly out in the afternoon.

Rogers Corp. — manufacturer of specialty phenolic molding materials, hard and soft nitrogen-filled cellular rubber and open-cell sponge-rubber compounds, and reinforced fluorocarbons (including strengthened Teflon)—took care to eliminate distractions. For example, at lunch, which lasted exactly one hour, all participants were served the same entree. "There was no time lost. When we sat down, the plates were brought in quickly, without time-consuming preliminaries of selecting and order-

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The announcement that Dow was on stream with 98% ethylenediamine was followed by a tremendous response from chemical, textile, pharmaceutical, agricultural, rubber, and petroleum products industries for commercial quantities. Soon it became evident that the only way to satisfy this increased demand was to build a new plant. Now, Dow's new Freeport, Texas plant—with twice the production capacity—is on stream and ready to process and ship orders for this highly concentrated and economical form of ethylenediamine.

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ing," says a company spokesman.

Credit for the new technique belongs to Rogers President Saul Silverstein and Marketing Director Norman Greenman. Under their guidance, means were probed that would cut into meeting time, shorten the time salesmen and home-office personnel were away from their jobs.

Obviously the techniques used for the Rogers meeting would not do for all CPI companies. For one thing, it's questionable whether many airport motels would have facilities for handling very large meetings. And, very often, sales meetings cannot be handled in a single working day.

If the size of the group is small, however, and if careful planning and split-second timing would result in a satisfactory one-day meeting, this technique looks promising. It is especially attractive from a dollars-and-cents standpoint as a means of minimizing salesmen's time away from their territories—and sales.

Publicity Pointers

A great deal of industrial product publicity is "irrelevant, incompetent and immaterial"—and unused by industry's publications 90% of the time. And it's largely because the material is written without regard to five simple rules.

So said public relations man Alec Jordan last week to members of the Synthetic Organic Chemical Manufacturers Assn. Jordan, president of W. Alec Jordan Associates (New York), told his listeners that his comments stemmed from experience on "both sides of the editorial desk." He formerly was *CW* editor-in-chief.

His five rules for improving product publicity:

- Know your publications and send them only material of legitimate value to the publications' readers.
- Keep your releases to a reasonable length—long enough to say what needs to be said—and no longer.
- Make sure you say something worthwhile—don't try to synthesize news.
- Shun, at all cost, the use of lush adjectives.
- Above all, write for the editor and not for your boss or your own company people.

Ignoring these rules, most writers turn out product releases "to impress,

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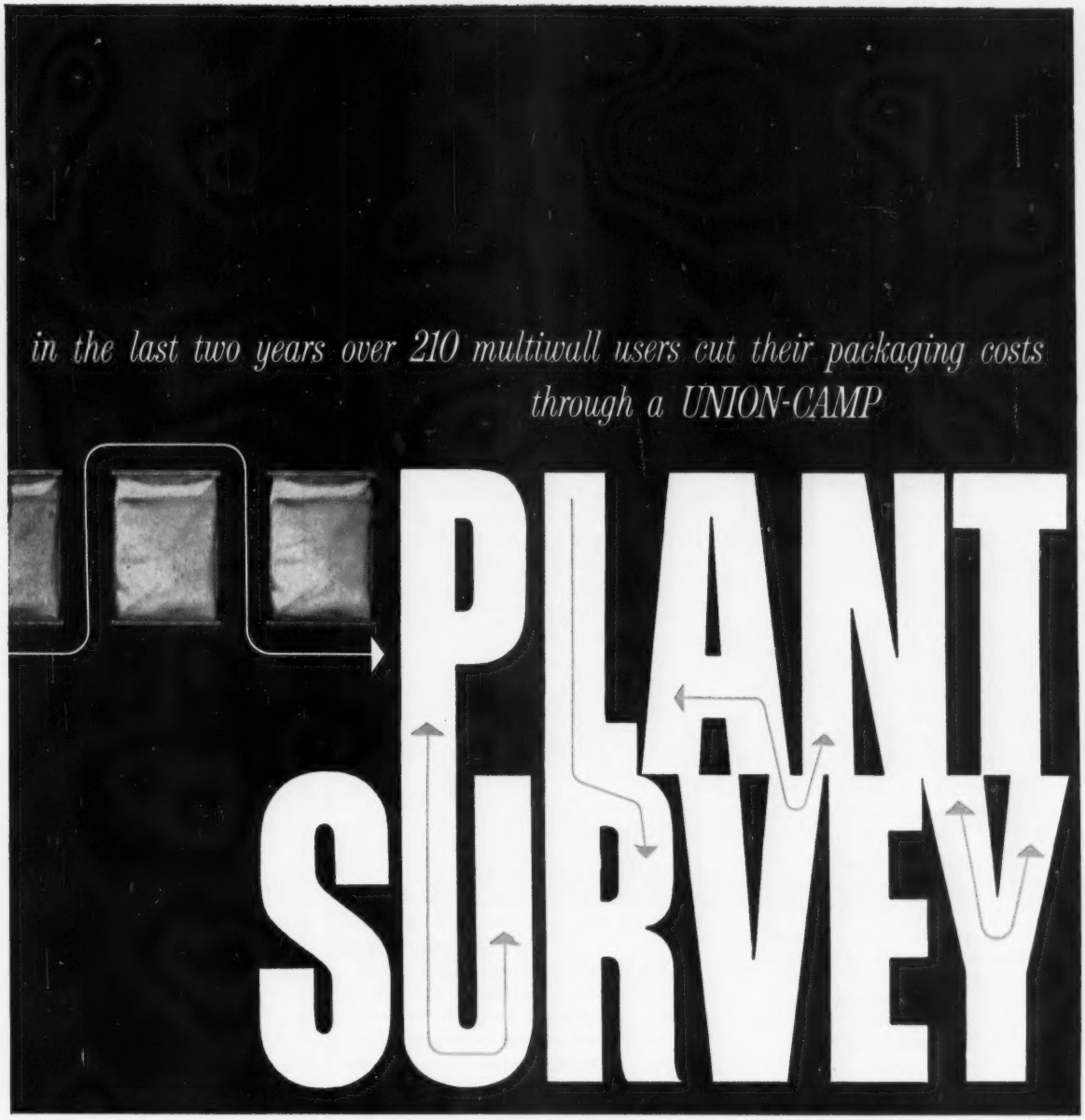

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A UNION-CAMP multiwall specialist will be glad to review your present operation . . . show you how the 5-Star Plan can help produce more economical, more efficient control. The plan also covers bag design, bag construction, specifications control and packaging machinery. It's yours without cost or obligation.

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SALES

not to express," Jordan said. "They're short on fact; instead, they glitter with generalities and self-centered adulation." Result: publications in SOCMA's field reject well above 65% of the publicity pieces they receive.

New Officers: SOCMA members also heard a nominating committee report listing the following slate of officers for '60 and members of the board of governors, class of '62:

President—Samuel Baker, general manager of Organic Chemicals Dept. Du Pont; first vice-president—Carl Gerstacker, vice-president of Dow Chemical Co.; second vice-president—Chester Brown, president of Allied Chemical Corp.; treasurer—Norman Babcock, vice-president of Union Carbide Olefins Co., Union Carbide Corp.

Board members, class of '62—Robert Aude, vice-president and general manager of Heyden Chemical Division, Heyden Newport Chemical Corp.; Arthur Kroeger, assistant general manager of Organic Chemical Division, Monsanto Chemical Co.

Honorary board members, class of '60—Elvin Killheffer; and August Merz of American Cyanamid Co.

DATA DIGEST

- **Pearl Pigments:** Eight-page booklet describes characteristics uses of natural and synthetic pearl pigments. Text discusses dispersion and orientation of pearl crystals, choice of pigment types, formulations, application procedures. Mearl Corp. (New York).
- **Surfactants and Detergents:** New 24-page bulletin presents company's line of surfactants, detergents and emulsifiers. Properties discussed include solubilities, viscosities and various surface properties. Soap Dept., Swift & Co. (Chicago).
- **Radiometric Analysis:** Technical bulletin defines radiometric analysis, discusses methods of performing radiometric precipitation-titrations. Also given: examples of applications and literature references. Nuclear-Chicago Corp. (333 East Howard Ave., Des Plaines, Ill.).
- **Chlorine Manual:** Third edition of chlorine reference book furnishes complete background on the materials, equipment and practices that contribute to safe handling methods. Manual also lists important properties and procedures for handling emergencies. Chlorine Institute (New York).

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1-60	28-32	0-2	100-99
3-60	23-28	2-4	99-97.9
20-60	21-25	19.5-24	89-86
1-30	4-6	0-3	100-98.5
20-30	4-6	19.5-21.5	89-87.7
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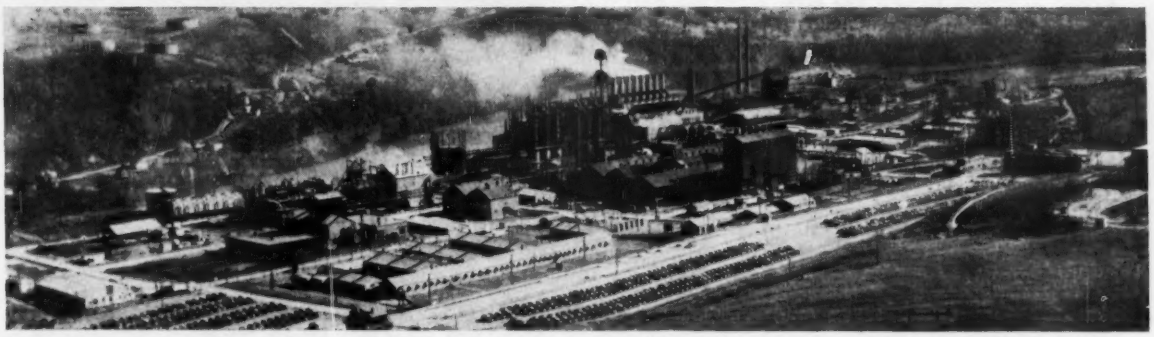
Morgantown bids for a buyer



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- **Ready access to rail and water transportation**
- **Salt deposits usable for caustic-chlorine**

Morgantown: Worth a Second Look?

This week several major chemical companies and steel manufacturers are taking a second look at the Morgantown Ordnance Works (near Morgantown, W. Va.), which General Services Administration has been trying to sell since late last year. Behind the renewed interest is an intensified selling effort by the Harry A. Taylor Co. (East Orange, N.J.), that is keyed to Singmaster & Breyer's specific suggestions on how best to use the plant's processing capabilities.

Although the Morgantown works can be bought for a small fraction of its original $64-million cost, there have been no takers since GSA put it up for bids last year. One likely reason: potential buyers may have felt they could negotiate a better price than they could propose in a sealed bid. To overcome this obstacle, GSA last month awarded Taylor—specialists in industrial real estate — a one-year contract as exclusive selling agent.

Also contributing to lack of interest in Morgantown's bargain price tag is the clear need for substantial additional investment to put the plant into economically competitive production. Taylor is trying to circumvent this by use of S&B's detailed plant study, first done for GSA.

Revamp Needed: Originally built and operated for the government by Du Pont, it was designed as a completely integrated facility for production of hexamethylenetetramine from ammonia and methanol. The synthesis gas section is based on coke-oven-gas operations, obsolescent and not competitive with newer plants using partial oxidation of natural gas.

Morgantown's location further complicates the economic picture, as far as ammonia is concerned, because newer, lower-cost plants surrounding it are closer to the major ammonia markets. Nevertheless, says Singmaster & Breyer, the site (just south of the western Pennsylvania border) has a number of attractive features for prospective purchasers interested in other products.

Latent Advantages: More important than the readily discernible values of the Morgantown Works, says Roy Sweet, S&B's manager of chemical engineering, are its latent values:

- The political climate is friendly at all levels from federal to local government.
- Labor is plentiful (availability of 5,100 of the area's total 19,580 labor population makes Morgantown a "labor distress area"), at low cost—e.g., 20-25% less than in the South Charleston area. All of the plant's operating superintendents are available for re-employment, simplifying a new owner's problem of resuming operations.
- Low-cost fuel and power are readily available. Monongahela Power can supply interruptible power at 5 mills/kwh.; heat from West Virginia coal can be obtained at about 18¢/million Btu. Natural gas may also become available at low rates.
- Transportation of raw materials and products can be handled easily by rail and water—9-ft. channels connect the plant with the Allegheny-Monongahela-Ohio river system.
- The 800-acre site provides ample room for expansion, is underlain by salt strata (at a depth of 8,000-8,500 ft.), which, coupled with low-cost power, would make caustic-chlorine production "feasible."
- Off-site facilities and offices are of "better than normal" building construction.

Synthesis Revamp: When S&B appraised the Morgantown Works for GSA, one of the first jobs it tackled was the evaluation of alternate "front ends" for the synthesis plant. After deciding that the coke-oven-gas route was technologically obsolete, says Sweet, the engineers first tried to de-

termine if coal gasification would be economically justifiable. A semiworks-scale gasification plant at Morgantown, operated by Olin Mathieson and the Bureau of Mines, proved to be economically unattractive. S&B concluded the gasification technique was too sophisticated, switched attention to proved methods.

Although such conventional processes as steam reforming and the Wellman-Galusha oxygen oxidation of coal yielded synthesis gas at costs considerably below that of Morgantown's coke-oven-gas plant, the Texaco process for partial oxidation of natural gas got the nod as the most economic alternate. The Texaco "front-end" should yield synthesis gas at a cost of about 45¢/1,000 cu.ft., says Sweet, compared with more than 75¢/1,000 cu.ft. by the old COG unit.

Mix and Markets: Considering product mix and marketing, S&B has worked out what it considers is the optimum utilization of the plant's existing facilities. The synthesis section includes five process loops—one for ammonia only, one for methanol only, and three that can be used interchangeably for either product. If the units were run for maximum ammonia production, the plant could produce 700 tons/day at an estimated cost of $40/ton (based on natural gas at 42¢/1,000 cu.ft.). Shifting the product balance the other way, methanol yield would be 400 tons/day, plus 175 tons/day of ammonia.

Since Morgantown is ringed by several other ammonia plants, S&B figures that maximum methanol production is a logical step. Reinforcing this view: methanol production is largely concentrated in the Southwest; Morgantown is handier to markets in the Northeast. At full production, the plant could turn out 18.7 million gal./year of methanol, 2 million of which could be converted into 11 million lbs. of 100% formaldehyde (produced as 37-41% solution).

To solve the ammonia marketing problem, S&B considered the possibilities for converting most of the output into other fixed nitrogen compounds. The recommended product mix from 184,000 tons/year of ammonia calls for 106,000 tons to be converted into 201,000 tons/year of ammonium nitrate and 29,200 tons/year of urea. About half of the nitrate and urea would be marketed as solids,

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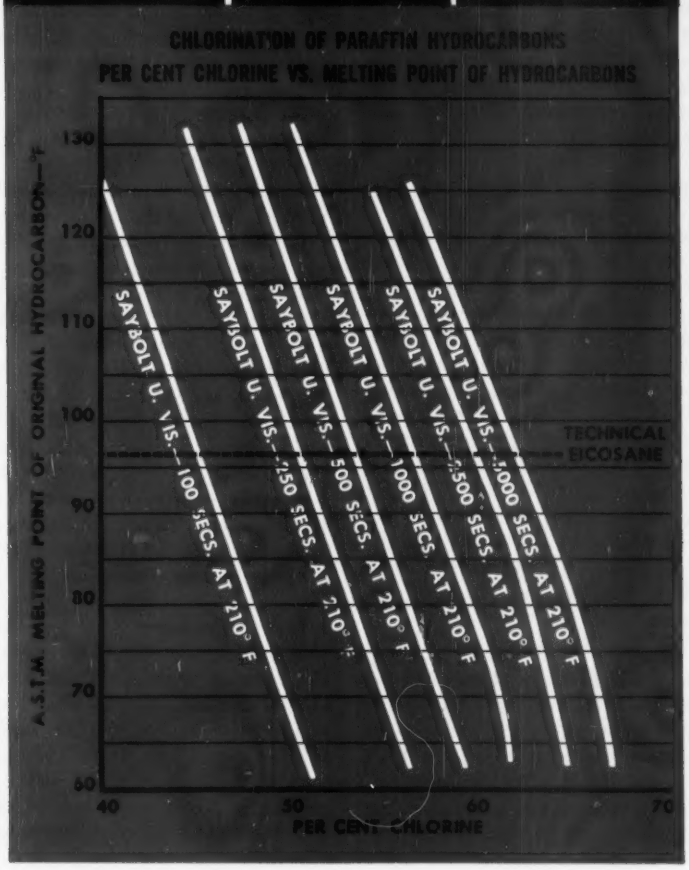

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the balance as nitrogen solutions.

Additional facilities to give this product mix, says Sweet, would cost about $12 million (including a substantial share for new storage capacity). Added to the $10-million cost of the Texaco partial-oxidation front-end, this brings the total investment for revamping the plant to $22 million—plus the price of the plant as is. But in return, says Sweet, the purchaser would have a completely integrated plant at about half the cost of building a new one of the same capacity.

Coking Facilities: Steel producers, too, could find a use for part of the Morgantown Works—the coke plant, available as a package apart from the chemical plant. Designed for 400,000 tons/year, it includes two batteries of 37 ovens each; by-product facilities for crude tar, ammonium sulfate, light oil and sulfur; and completely independent utilities.

Prime disadvantage of the coke plant, says Sweet, is the double haul required to bring in coal and ship out coke. However, haulage charges have been discounted in S&B's evaluation of the plant and the plant is reportedly being eyed by steel producers whose blast furnaces can be reached conveniently by the river transportation system.

PROCESSES

Methane Derivatives: Experimental studies of the effects of high-frequency electrical discharges with open electrodes in methane gas have produced a new polymer, the Rumanian Academy of Sciences reports. Rumanian scientist Eugene Badarau claims that the new compound is insoluble in most solvents, withstands temperatures to 400 C, possesses high specific electrical resistance and is highly resistant to acids. It's obtained as a by-product of acetylene, which Badarau claims can be produced simply and with high yield in high-frequency discharge apparatus.

•

Indian Urea Plant: Montecatini has landed the contract for the world's largest urea plant—a $21 million, 500-tons/day installation to be constructed at Neyveli, India. The plant will employ the total-recycle version of the Fauser-Montecatini urea process for the complete conversion of 300 tons/day of ammonia into urea. Synthesis gas will be produced by a lignite gasification in special units supplied by Germany's Pintsch Bamag, and an air fractionation plant.

•

Cementless Concrete: Russia's central laboratory for construction materials in Moscow claims to have developed a method for making large-pore prefabricated concrete blocks entirely without cement. The blocks are made of quicklime, furnace slag and ash, crushed gravel and crushed brick. After a 5-6-minute mixing step and 30 seconds of vibration, the material is pressed into blocks and stored at 15-20 C for 48 hours.

Final treatment with steam for 24 hours—including at least 2-2½ hours at 80 C—produces blocks that are said to withstand repeated cycles of freezing and defrosting. Binding strength of the blocks is attributed to the combination of unslaked lime (comprising about 60% of the mix) with the active slag and ash.

•

Rare Earths: The rare-earth metals appear to be headed toward an important role in materials of construction for nuclear plants and high-speed aircraft and missiles.

At last week's symposium on rare earths—sponsored by the American Society for Metals and the AEC in Chicago—General Electric revealed yttrium may hold the key to improved high-temperature oxidation resistance of iron-base chromium alloys.

Key to the potential utility of the rare-earth metals, say GE metallurgists, is high purity. Most promising purification techniques, at present, are distillation and solid-state electrolysis. Zone refining may be of value, they add, for removing some impurities—but none of the conventional metal-purification processes, with the possible exception of amalgamation, appears particularly attractive for commercial-scale production.

•

Isotope Producer: AEC last week selected a proposal by Lummus Co. for contract negotiations on a 20,000-thermal-kilowatt high-neutron-flux reactor to be built at Brookhaven National Laboratory. The Lummus proposal — one of eight received by AEC — named Curtiss-Wright Research Division (Quehanna, Pa.) as subcontractor for reactor de-

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To MEN who want to make history!

A LETTER FROM: **ROBERT SHATTUCK**

President, MARBON CHEMICAL

MARBON CHEMICAL

P. O. BOX 68 • WASHINGTON, WEST VIRGINIA • VOlunteer 3-5353

ATTENTION HISTORY STUDENTS:

Question: What do these have in common?

King George II. George Washington. Borg-Warner.

Answer: King George II heard that the young civil engineer, George Washington, was a pretty good Indian fighter at Fort Duquesne, and he sent word saying, "George, as a little memento for your work, when the shooting is over, I will let you select for yourself a choice plantation site anywhere along the beautiful Ohio River." Well, Washington looked around, and his choice was a tract of land then part of the old Virginia Colony, but now known as Washington, West Virginia. In turn, Borg-Warner endorsed Washington's judgment by choosing the same spot for the Marbon Chemical Division. Of course, some years later, I imagine, King George III may have regretted his grandfather's generosity when he found that George Washington's ability was not limited to fighting Indians.

The Marbon Chemical Division was created 25 years ago by Borg-Warner. It began with a small research group in Gary, Indiana. Resins based on crude rubber were the initial product line. In time, we moved into specialty adhesives and butadiene styrene resins for the rubber and paint industry. In the last few years we have launched Cycolac, a rigid, tough, thermoplastic *ABS* polymer, gaining wide usage for telephones, automotive parts, appliances, pipe, and many other injection molded, calendered, and extruded applications.

The growth resulting from Cycolac and other products, as well as future objectives of the company, made it desirable to find a new location. A thorough survey of a number of areas resulted in selection of a 338 acre site on the banks of the Ohio River. This location is an ideal choice for us because it is centrally situated in our market area, with an abundant water supply, good water transportation, availability of natural gas, and in an area that provides employees with a wholesome living environment. In addition to the beautiful countryside, the Ohio River provides miles and miles of fishing and boating area. Parkersburg, West Virginia—a city of 60,000—9 miles away—is a pleasant community, ideal for family living. The programs of great variety carried on by Marietta College at Marietta, Ohio, and by Ohio University at Athens, add culturally to the area.

Our operations at Washington include a new $10,000,000 emulsion polymer plant, a research center, and administrative offices. Marbon is made up of men who are primarily innovators, not imitators. Variety of activity is more the rule than the exception. For example, a research man has the satisfaction of following his developments from the lab through the pilot plant and into production. Not infrequently, he may also lend a hand to the sales group. Marbon has the character and aggressiveness of a small company with the financial strength of Borg-Warner to assure realization of sound development. Our people have come to us from many industries, such as petroleum, synthetic rubber, paints, coal chemicals, as well as several totally unrelated fields. Some hold Ph.D. degrees, some Bachelor degrees, and some no degree at all, with varied backgrounds proving to be a point of strength.

The plastics industry is at the beginning of its growth cycle. Marbon is in a strategic position as a growth company in a growth industry. We are looking for able people to grow with us. Research people are needed to develop further modifications of our present products and to pursue some entirely new concepts. Engineering—maintenance —sales—product development—production—will all require numerous additions. If you think you could fit into this picture, send us a letter about yourself, and we will see if something can be worked out. If we don't have something of interest to you now, we will let you know, and we will keep you in mind for future reference as we grow.

Please direct your letter to my personal attention and I will see that you receive a prompt reply.

Sincerely yours,
MARBON CHEMICAL DIVISION
Borg-Warner Corporation

R. Shattuck

Robert Shattuck
President

sign. The system will use uranium-aluminum-alloy fuel and heavy water as moderator, coolant and reflector. It will be used for isotope production and for studies of compositions of solids, diffraction measurements, and alignment of nuclear particles.

•

Dealkylation Process: The Houdry Process Corp. (Philadelphia) has developed a new dual-purpose, one-step catalytic process, called Litol, for the purification and dealkylation of aromatic light oils. Litol, worked out with an Eastern steel company, appears to be of particular interest to coke-oven operators, can be used to recover pure benzene, toluene and xylene.

The process is one-step operation, eliminates the costly azeotropic distillation or solvent extraction of current BTX recovery processes. Purified benzene product contains less than 1 ppm. thiophene and has a minimum freezing point of 5.4 C. Since catalytic dealkylation is part of the process, additional benzene may be produced from toluene and xylene in the feed. Destruction of aromatics is said to be negligible.

•

Cracking Process: Badische Anilin- & Soda-Fabrik AG. (Germany) is using a new type of fluidized-bed cracking process to produce ethylene and other olefins from crude oil. Liquid crude is cracked in a whirlpool of petroleum coke. The reaction can produce coke if desired; but it yields primarily olefins, some aromatic hydrocarbons, and a recycle cut, which is mixed with oxygen and fed back into the reactor to supply cracking heat. Simultaneous with the cracking step, a gasification reaction produces carbon monoxide and hydrogen, which are separated by low-temperature distillation and used to produce ammonia and methanol. By-product heat is used to supply all of the plant's steam requirements.

•

Iron Recovery Plant: Farbenfabriken Bayer AG. (Leverkusen, Germany) has constructed a 180,000-tons/year plant for processing by-product ferrous sulfate from its titanium dioxide plants. The new unit solves water-pollution problems, can also produce 58,000 tons/year of 96% sulfuric acid, 52,000 tons/year of ferric oxide.

Tracers

TO THE CHEMICAL PROCESS INDUSTRIES

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POSITION VACANT

Technical Service: An excellent opportunity for young man to join the Technical Department of the expanding Plastics Division of Spencer Chemical Company. This man should have a strong background in chemical engineering or chemistry, with a minimum of three years' experience in the field of polyolefins. He will conduct studies on extrusion and molding of polyolefins and nylon, and have intimate contact with field techical service work. In reply, please send detailed resume of experience, education and salary requirements to: Personnel Manager, Spencer Chemical Company, 610 Dwight Building, Kansas City 5, Missouri.

Organic Chemist: Spencer Chemical Company is seeking an organic chemist with a Ph.D. degree or its equivalent for its rapidly expanding Plastics Division. This position is in connection with an expanded program for the study of new polyethylene additives to improve slip, anti-block and anti-static properties, ultraviolet stability, and anti-oxidant characteristics. Experience with high polymers desirable but not essential. Please send detailed resume to: Personnel Manager, Spencer Chemical Company, 610 Dwight Building, Kansas City 5, Missouri.

Assistant Purchasing Agent, Central Purchasing Department of multi-plant National Company. Excellent opportunity. Chemistry or Chemical Engineering degree preferred. 5-10 years chemical puchasing experience. Send resume to Even D. Adams, Industrial Relations Department, W. R. Grace & Co., Dewey and Almy Chemical Division, 62 Whittemore Avenue, Cambridge 40, Massachusetts.

Chemists, Chemical Engineers: New research emphasis at Sun Oil Company offers challenge. Immediate positions with career opportunities in expanding exploratory research. Development of polymers, fuels, lubes, organo-metallics. Fundamental and exploratory chemical research on catalysts, films, lubricants. Process development pilot plant studies, engineering design, operations research and technical economics. Supervision of polypropylene pilot plant operations. All degree levels. Send resumes to Research and Engineering, Sun Oil Company, Marcus Hook, Pa.

Chemists or Chemical Engineers. Production and related work in the manufacture of chemicals, dyes and intermediates. Medium-sized plant in North Central Pennsylvania. Scenic area has excellent hunting and fishing. P-2979, Chemical Week.

If you are a manufacturer seeking new or added sales outlets—or if you are a manufacturer's agent or chemicals distributor with the capacity, time and energy to take on additional lines—make your interests known in this column of Chemical Week. The right agent or jobber teamed up with the saleswise manufacturer makes the right combination for the hard selling days ahead. There's profit for both, which can be initiated through low-cost classified advertising. Write Employment Opportunities, Chemical Week, P.O. Box 12, New York 36, N. Y.

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Mfgs., Importers & Distributors. We can warehouse, distribute and ship your product anywhere in the United States at guaranteed Lowest Rates! Our warehousing service can be custom designed to meet your individual needs. Open to any kind of offer. Warehouse facilities include sprinkler system, railroad siding, and tailboard truck loading. Ideally located in metropolitan New Jersey. SS-3046, Chemical Week.

FOR SALE

$3,000,000 Liquidation-Chemical Plant at Orange, Texas. Type 316 Stainless Steel Tanks, Kettles, Heat Exchangers, Columns, Stills, Crystallizers, Centrifugals, Pumps, Valves, etc. Wonderful Values. Send for list. Perry Equipment Corp., 1415 N. 6th St., Philadelphia 22, Pa.

Powdered soluble Saccharin (U.S.P.). Packed in 100# drums. High Quality. Moderately Priced. Chemical Advance Corporation, 1343 Arch Street, Philadelphia 7, Pa., Phone: Locust 3-1730.

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1860 sq. ft. T316 Stainless Heat Exchanger, ASME code 75# WP. Removable bundle, 1953. Perry, 1415 North 6th St., Phila. 22, Pa.

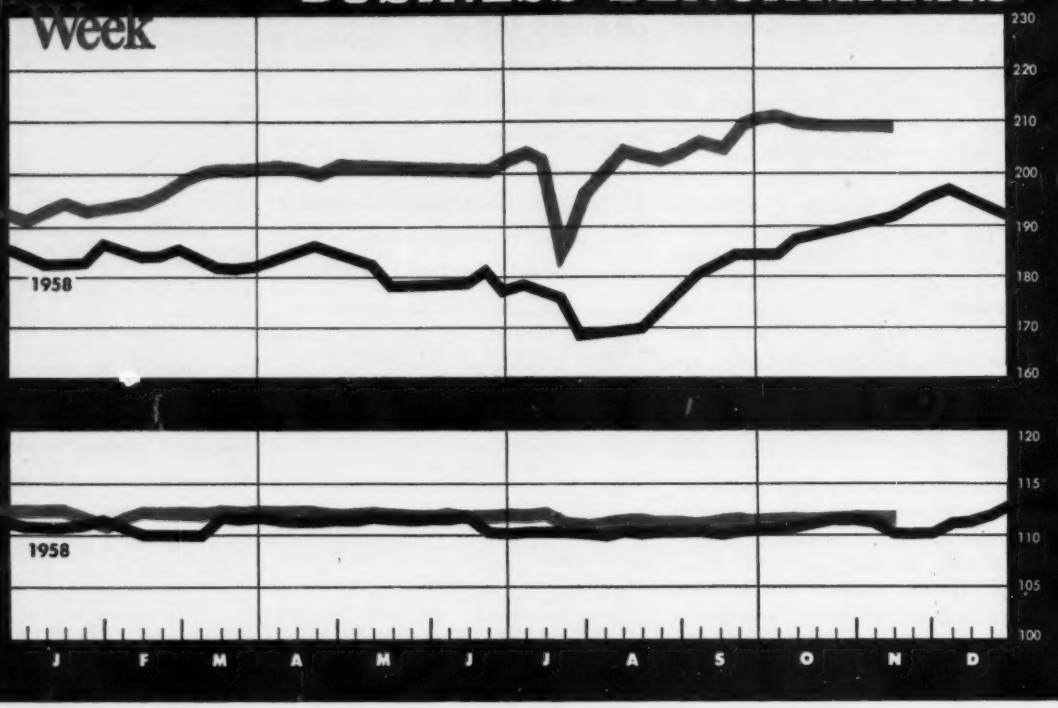
Laboratory apparatus and glassware for sale. Call: Circle 7-7248, New York.

This Tracer Section can be used whenever you are looking for or offering Equipment, Plants, Supplies, Chemicals, Opportunities, Special Services. The rates are low—just call or write Classified Advertising Division. Chemical Week, P.O. Box 12, N. Y. 36, N. Y., LOngacre 4-3000.

MISCELLANEOUS

To Employers Who Advertise for Men: The letters you receive in answer to your advertisements are submitted by each of the applicants with the hope of securing the position offered. When there are many applicants it frequently happens that the only letters acknowledged are those of promising candidates. (Others do not receive the slightest indication that their letters have even been received, much less given any consideration.) These men often become discouraged, will not respond to future advertisements and sometimes even question if they are bona fide. We can guarantee that Every Advertisement Printed Is Duly Authorized. Now won't you help keep our readers interested in this advertising by acknowledging every application received, even if you only return the letters of unsuccessful applicants to them marked say, "Position filled, thank you." If you don't care to reveal your identity, mail them in plain envelopes. We suggest this in a spirit of helpful co-operation between employers and the men replying to Positions Vacant advertisements. Classified Advertising Division, McGraw-Hill Publishing Company. "Put Yourself in the Place of the Other Fellow."

BUSINESS BENCHMARKS

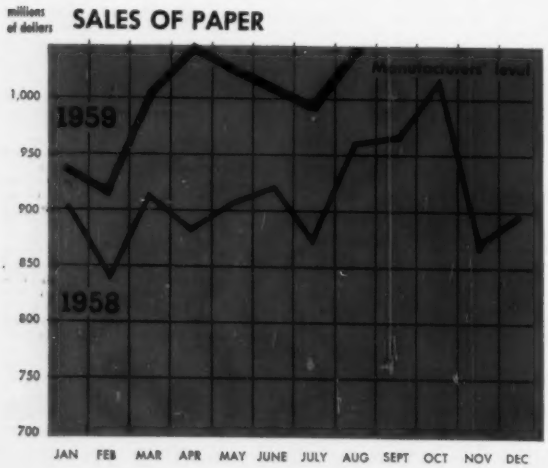


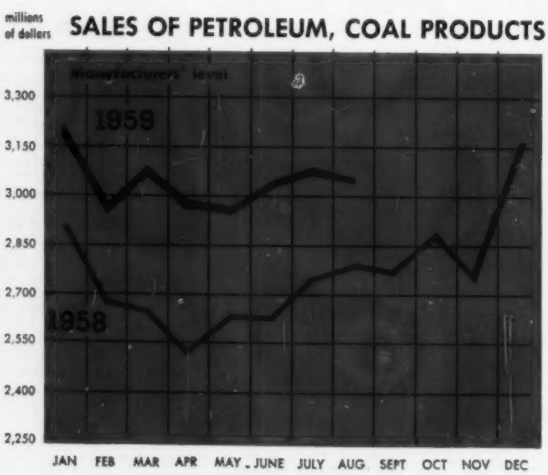
NOVEMBER 14, 1959

WEEKLY BUSINESS INDICATORS	*Latest Week*	*Preceding Week*	*Year Ago*
Chemical Week output index (1947-1949=100)	208.8	209.0	193.0
Chemical Week wholesale price index (1947=100)	111.5	111.5	111.2
Stock price index (12 firms, Standard & Poor's)	53.39	58.07	46.00
Steel ingot output (thousand tons)	368	371	2,011
Electric power (million kilowatt-hours)	12,978	12,762	12,330
Crude oil and condensate (daily av., thousand bbls.)	6,887	6,875	6,911

WHOLESALE PRICE INDICATORS	*Latest Month*	*Preceding Month*	*Year Ago*
All commodities (other than farm and foods)	128.4	128.4	126.2
Chemicals and allied products	109.9	109.7	109.9
Industrial chemicals	123.8	123.7	122.7
Paint and paint materials	120.5	120.3	119.0
Drugs, pharmaceuticals and cosmetics	93.5	93.4	94.4
Fats and oils (inedible)	55.0	53.8	61.7
Fertilizer and materials	105.2	104.8	104.3

CHEMICAL CUSTOMERS CLOSE-UP





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SbF_3	Antimony Trifluoride, Purified	
	Chloral Hydrate, U. S. P.	$CCl_3CH(OH)_2$
CrO_2Cl_2	Chromyl Chloride, Tech.	
	Cobalt Chloride, Anhy. Powd. Reagent	$CoCl_2$
$CoCr_2O_7 \cdot 1\frac{1}{2}H_2O$	Cobalt Dichromate, Tech.	
	Ferric Pyrophosphate, Soluble, N. F. VII	
	Iso Amyl Alcohol, Reagent Grade	$(CH_3)_2CHCH_2CH_2OH$
$MgCrO_4 \cdot 5H_2O$	Magnesium Chromate, Tech.	

11 FINE CHEMICALS

new products . . . new grades, strengths, forms for you to investigate and work with

	Manganous Nitrate, 58% Solution, Electronic Grade	$Mn(NO_3)_2$
K_2SO_4	Potassium Sulfate, N. F. VII, Crystal & Powder	
	Silicon Tetrafluoride, Purified	SiF_4

Here are some of our newest fine chemicals—one or more of which may fill a need or provide a lead for you. Two of these products—silicon tetrafluoride and chromyl chloride – have not previously been readily available. Others are new in grade, or strength, or physical form. All are additions to the B&A line of more than 1000 reagents and fine chemicals which are recognized as offering the highest in chemical quality and purity.

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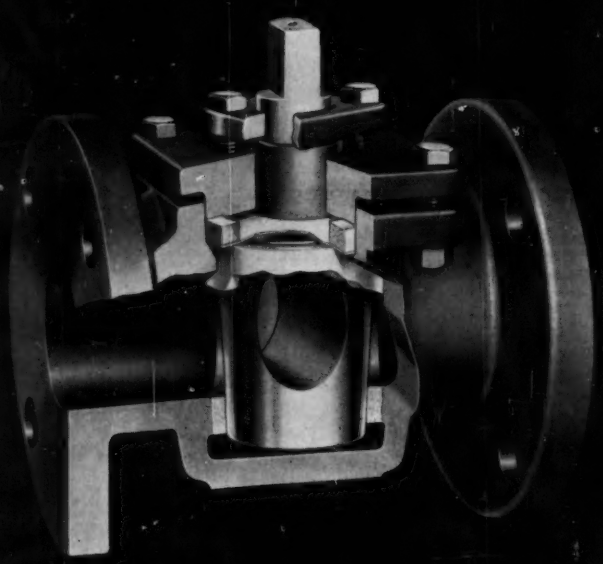
The new Durco Type G SLEEVELINE is a non-lubricated plug valve. A Teflon sleeve is pressed into a ductile iron or stainless steel body; a machined plug, Teflon diaphragm and gasket, a thrust collar, and a self-aligning adjuster make up the rest of this trouble-free, non-lubricated plug valve.

Available in ductile iron or stainless steel, screwed or flanged ends from ½″ through 2″, and in ductile iron flanged ends 3″, 4″, and 6″. 150 psi rating.

Write for bulletin V/12.



THE DURIRON COMPANY, INC., Dayton, Ohio

sulfuric acid service

"Entirely satisfactory in service on 66°Bé sulfuric acid after 8 months."

latex user

"Valve on Latex service since May 1, has given no trouble. Other valves (gate, globe, ball, wedge, lift plug) failed because Latex build-up froze the valve."

chlorine gas service

"In service for ten months on chlorinator handling dry chlorine gas at 50 psi —ambient temperature. Formerly used lubricated valve which gave considerable trouble due to freezing."

caustic service

"Valves used on cell liquor, concentration 12%, at 160°F. After one month valve was removed and inspected. All movable parts were free, no wear was evident. Valve was reinstalled and has been in six months continuous service with completely satisfactory performance."

phosphorous user

"Used on yellow phosphorous at 160-200°F. Valves are doing fine. Thanks for a product that works—and a valve that I can turn with one hand without breaking my back."

solvent handling

"Valves performing very well on toughest solvent service after five months, where lubricated plug valves were regularly replaced due to sticking caused by leaching out of lubricant."

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